

portable

100/200/600 TANDY BRIEFCASE COMPUTING

THE INTERACTIVE PUBLICATION

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the next step in port-
able computing

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Interconnecting
your favorite laptops

PUT A TURTLE IN YOUR TANK

Mini-Logo program
portable

NEWS

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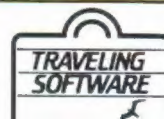
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100/200/600

JANUARY 1986

VOLUME THREE, NUMBER FIVE



ON THE COVER

A BOOK THAT TALKS BACK 39

Welcome to the world of interactive publications. My name is DYNA and I'm here to help you.

By Mark Schorr and Rodney Owen

Cover photos and illustration by Benjamin Magro and Marjorie Strauss

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SOME HISTORIC BREAKTHROUGHS DON'T TAKE AS MUCH EXPLAINING AS COMPUSErVE.

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To access CompuServe, you'll need a CompuServe Subscription Kit; a computer, terminal or communicating word processor; a modem and in some cases, easy-to-use communications software.

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ROM WITH A VIEW

IT CAN'T BE DONE. RIGHT?

I came here from a computer software company that specializes in database programming for the publishing industry. Circulation fulfillment, advertising sales, that kind of thing. It was a small operation, starting out with three people and pushing double figures when I left.

Anyway, one of my many jobs was to oversee product development. Important to that role was coming up with ways to perfect our offerings. Generally, this involved suggesting simple improvements to data entry screens or report-format changes. But occasionally complicated program revisions were necessary.

That situation often put our programmers into a tizzy. They'd throw up their arms in disgust and say, "It can't be done!" But that simple phrase turned out to be their single greatest motivator. Almost every time, they proved themselves wrong. I'd find a solution outline on my desk within the week and be viewing the idea in action soon thereafter.

IT'S BEEN SAID BEFORE

Having just compiled the *Portable 100/200/600* soon-to-be annual article index, I'm impressed by how many new products have been reviewed in these pages. All started out as vague ideas. Yet through a lot of hard work and determination, they all came to fruition.

It makes me wonder just how many times the phrase, "It can't be done!" has been uttered in the past few years. I'd suspect hundreds, probably thousands of times. Out loud or under one's breath. In cramped back rooms piled high with electrical gadgetry and in pristine offices high above Fort Worth. From Seattle to Dallas to New York. All across this country and others.

It seems a trait of the human psyche that the more difficult a task seems, the more determined we are to overcome it. This characteristic is true enough in the computer industry as a whole — and positively rampant in the portable market. Look at the spreadsheets, expansion RAMS and multi-ROMs that have been introduced in the past year. Considered nothing short of ridiculous three years ago, now they're old hat.

And so what's in store for us portable users during the next year? Well, I'd like to suggest maybe a built-in streaming tape drive, high resolution color display, a 256K RAM module, ten megabyte hard disk, replaceable batteries that last at least a year, dBase II or equivalent, a 2400 bits per second (bps) modem and a high speed portable letter quality printer. Naturally, all these options together shouldn't jeopardize portability and should sell for under \$100.

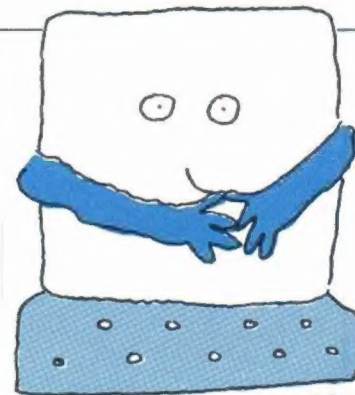
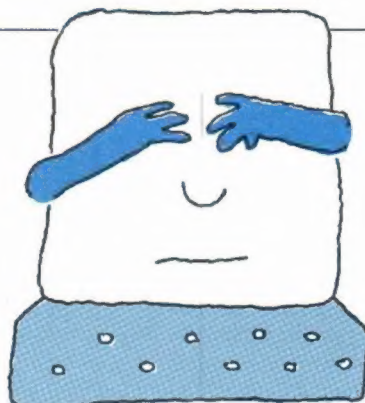
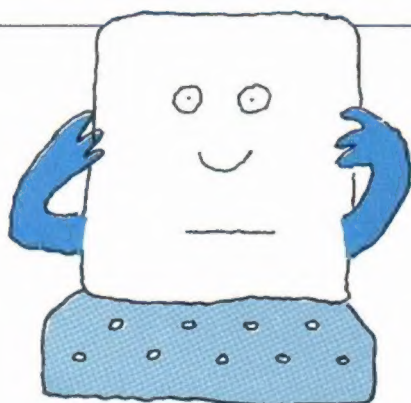
I could go on but I know, I know. It can't be done. Right?



Jack M. Morris

Senior Editor

ADC REVIEW REVIEWED



A. Mr. Bim

I'm very pleased that our ADC-1 Data Acquisition and Control System was selected for review in your September issue, and commend Carl Oppedahl for the fine job he did. Regarding that review, however, a few points should be made clearer.

We've encountered no problems with laptop computers because of their five-volt signals (which are well within the RS-232 guidelines of three to 12 volts). The ADC-1 is commonly used at more than 50 feet from a laptop at 9600 b.p.s. with ordinary unshielded twisted-pair wire, and at distances of several hundred feet with the same type of connection at lower data transmission rates. This can be very important — in certain applications it is best for the interface to be close to the sensors, but the computer can be conveniently located a great distance away.

It should be pointed out that the NEC PC-8201 has two additional serial ports which communicate with TTL logic. The ADC-1 is designed to interface with this protocol as well, so these ports can be used for data acquisition, leaving the RS-232 channel free for modem communication. Anyone who needs access to these ports may feel free to write or call us for detailed information.

The ADC-1 was characterized as requiring a "watt or less" to operate, which is true, but a little misleading. Actually, ten ADC-1s running at the same time will consume a watt or less. This is an important point to us because of the many applications that pair up ADC-1 systems with laptop computers

and battery power-supplies.

There is no problem with BASIC's interpreting a CHR\$(26) as an EOF indicator, as all programs that we list in the owner's manual for the Model 100 and the NEC use the OUT command and the INP() function. I was a little puzzled that a reviewer would go to such lengths to use our product in a way we don't recommend, then report that the "ADC-1 has a problem."

Since the issue was raised, I should point out the owner's manual for the ADC-1 has been indexed and extensively cross-referenced for many months. The older version as reviewed was not indexed, as Mr. Oppedahl pointed out.

Finally, we don't want to mislead anyone about our prices. The standard model of the ADC-1 sells for \$449. Two prices appeared in the magazine, neither of which was correct. Options are available to provide 32 single-ended analog inputs, 12 controlled outputs, instrumentation amplifier for direct reading at microvolt levels and other features of interest to researchers. A previous option, analog input at speeds up to 100 samples per second, is now standard for all ADC-1s.

Keith Ronnholm
President

Remote Measurement Systems, Inc.

We passed your letter along to Carl Oppedahl. This is his response:

First, I'm sorry I got the price wrong. I really have no excuse since the \$449 price appears in a price list that was shipped to me with the unit.

I don't dispute Mr. Ronnholm's claim that he has been able to put several hundred feet of cable between the Model 100 and the interface. The resistance to noise can be improved by lowering the baud rate or by using twisted-pair or shielded cable. Nonetheless, the circuitry used in the Model 100 and Tandy 200 fails to satisfy the RS-232 standard, since under a 3000-ohm load its RS-232 output generates less than five volts. This is not a criticism of the ADC-1 (nor of Senastrol, the other product reviewed). All I meant to convey was that a computer that meets the RS-232 standard will, in general, be capable of driving longer lines than can the Model 100 or Tandy 200.

As for the power consumption, I should have said "much less than one watt." Both interfaces draw minuscule current, allowing unattended battery operation for periods of weeks or months.

As for the end-of-file (EOF) criticism, let me start by pointing out that the Model 100 and Tandy 200 are ASCII-based machines, giving precisely defined responses to receipt of characters such as 13 (carriage return), 26 (end-of-file), and 17 and 19 (Ctrl-S and Ctrl-Q, XON and XOFF). In my view, any device which connects to the RS-232 port should confine its output to the printable ASCII character set, sending characters with decimal values under 32 and over 127 only when called for. (Senastrol is such a device.)

When a byte enters the computer serial port, an interrupt goes to BASIC and the byte is stored in a buffer. The user can count on BASIC not to lose any data. BA-

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MEN-U-TILITY

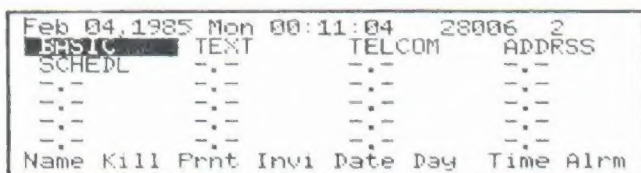
Men-u-tility is a powerful new utility for your Model 100. Once installed it is completely automatic and comes up when ever you would normally return to the main menu. As you move the cursor bar over the files, the length of each file is instantly displayed in the upper right corner. Men-u-tility adds 8 function keys to your main menu. You can kill files, rename files, make files invisible, set the day, date and time without ever leaving the menu.

Men-u-tility is also a print formatter. With F3, you can print any .DO file to your printer and you decide the right and left margins, top and bottom margins and page length! F8 sets an alarm that will go off no matter what mode you are in, BASIC, TEXT, TELCOM, etc.

If you have the Disk Video Interface (not required), the menu will appear on whatever screen you are using.

Men-u-tility only requires 1.8K of RAM and won't conflict with your other machine language programs. (100)

\$24.95

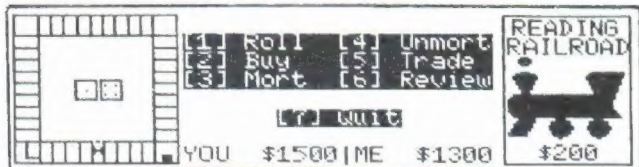


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It's you against the computer and the computer is a tough competitor. The computer makes all its own decisions. Super fast machine language graphics display the whole board at all times. You can tell at a glance who owns what property and the number of houses on each. It never takes more than 1 or 2 seconds for the computer to decide what to do. The computer is such a good player that you'll be lucky if you even win half of the time. (100,200,NEC)

*Monopoly is a trademark of Parker Brothers.

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Melody Maker

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BYTEFYTER

Now you can expand the memory capacity of your portable computer by reducing the size of the programs that you store in it. Bytefyter is a 100% machine language program that does just that. It is relocatable so that it won't conflict with any other machine language programs that you use now, or may use in the future.

Bytefyter works on your BASIC programs just as they are, IN PLACE. It strips unneeded spaces and remark lines. But that's not all! Bytefyter is smart! Bytefyter combines the lines of the BASIC program to whatever maximum length you specify. Each line of a BASIC program takes 5 bytes just for the line number and pointer information. By combining lines, Bytefyter saves a tremendous amount of space, space that could be used for another program or text file. Bytefyter actually checks the logic of your programs and doesn't combine lines that would cause the program to crash.

Bytefyter is amazingly fast. It will do its job on even the largest BASIC program in just seconds. You'll want to use Bytefyter on all your BASIC programs, whether you wrote them or bought them. (100,200,NEC)

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RENUMBER

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Renumber is FAST! It will renumber even the largest BASIC program in just seconds. You can renumber all or just part of a program. You decide the starting line number and the increment to use. It couldn't be any simpler. This is one utility that the serious BASIC programmer just can't afford to be without! (100,200)

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for the Model 100/200

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M-200

\$499

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six powerful programs

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Drive weighs only three lbs. and it works directly from the 110 outlet and recharges at the same time. It recharges in six hours with thousands of pages transferred between charges. It's compact, with dimensions of 2¼" x 5½" x 7.5"; and fits easily into your briefcase along with your Model 100 or 200.

Machine code programs, BASIC programs, *Lucid* files and documents all are saved and retrieved with no protocol—instantly, ready to run.

In a special association, Holmes Engineering and PCSG have worked together combining the hardware knowledge of Holmes and the software expertise of PCSG. The result is a product that can only be regarded as excellent.

You see the disk directory instantly; works just like the main menu

Here is what is really exciting. The portable disk drive has Random Access. Included as part of the operating system in the drive (ROM) is a very powerful disk BASIC.

This means that you can have BASIC programs that will access the diskette and read and write records directly on the diskette.

Just imagine yourself with this kind of capability.

Database—The portable disk drive stores your mailing list, inventory items, part #s and descriptions or any other data that you need to recall.

358K on a diskette

Invoice (purchase order)—At the touch of a button you can print out your sequentially numbered, professionally done invoices. This is truly professional invoicing capability.

Purchase orders are just as easy.

Sort—This excellent utility allows you rapid sorting of any records you have compiled. You can write the newly sorted list back in the same file on the diskette or to a new file.

Telecom interface—If you are a user that likes to access other computers or databases (for example CompuServe) by telephone then this powerful facility alone is worth the price of the disk drive. You can automatically download and upload information onto the diskette.

Calendar—Everyone who has seen this program has said, "This is the first calendar/

diary/scheduler on any computer anywhere that I can use. It is so functional."

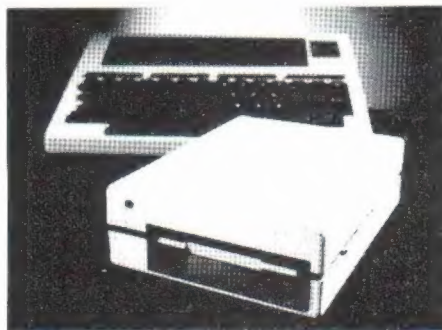
The calendar program is usable for two reasons, first it is designed correctly, and second you have the memory (358K) on the diskette to log and access a tremendous amount of notes over a long period of time.

Personal Finance Manager—This wonderful program truly lets you keep track of your finances.

All your records are kept on the diskette. Bank accounts (checking and savings) and charge accounts such as MasterCard and Visa.

We at PCSG believe we have the ultimate Model 100 system, the Portable Disk Drive plus the *Lucid* spreadsheet on snap-in ROM, *Write ROM* word processing and the new 64K RAM expansion now available from PCSG.

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Circle 37 on Reader Service Card

SIC commands INPUT\$ and LINE INPUT may be used to process the bytes.

The ADC-1, however, regularly sends values under 32 as part of its routine data transmissions. Mr. Ronnholm correctly points out that the sample programs in the ADC-1 owner's manual use the INP() function rather than the BASIC INPUT command to receive information from the ADC-1, and I have confirmed that the programs work in the sense that they do collect the data. But when serial data is collected via the INP() command, this bypasses the BASIC buffering routines. So if you were to use INP() in your own program to collect data from the ADC-1, you might lose a byte or read a byte twice. Unless, of course, you examine the port at just the right moment, but it's hard to know when that is. The hardware signal DR (data received) from the UART could tell you, but it gets routed off to a CPU interrupt pin, so you can't get at it with an INP() function.

The ADC-1 sample programs provided use a software delay loop designed to wait the right length of time.

Let there be no misunderstanding — the published ADC-1 routines for the Model 100 do read the data. I'm just stating my view that it would be easier and more trouble-free for users who do their own interface programming if they use BASIC LINE INPUT or INPUT\$ commands. — Carl Oppedahl

SHOW ME A WAY

I'm a member of various search and rescue organizations. Several of our members use Model 100s. The programs we use, however, are written by our members. Do you know of any programs relating to search and rescue and radio direction finding? We'd appreciate any help locating programs we can use.

*G. Jude Miller
Anse La Butte, LA*

We ran an article titled "Navigating With Your 100" in our December issue. The program may be of some help although it was not written with search and rescue in mind.

We are not aware of any commercially available programs written specifically for your needs. That doesn't mean they aren't out there. Can anybody help?

— Ed.

WE'RE GETTING BETTER TOO

Since the articles in your October issue are such an improvement over those

in past issues, rather than rate them on the reader service card, I feel a letter is more apropos. Usually the arrival of my copy is like a visit from an old friend — nice for a short time but interest quickly wanes. However, Mr. Straayer's article ("Getting Better All The Time") is especially interesting. I've spent several hours absorbed with it. I don't know who on your new staff chooses the articles but don't let him get away.

Portable 100 certainly has had its problems in the past but, if future issues are the quality of this one, it's well on its way to taking its place among the other computer magazine greats. Please, keep it up.

*Nathaniel F. Ireland
Marlow, NH*

Thanks for the vote of confidence. We're all working very hard to make each issue as rewarding as the one before. No one individual is responsible for the improving quality of the magazine. It's a team effort and, therefore, we appreciate your praise. — Ed.

BUT I HAVE A 200

I enjoy reading Portable 100. However, there's one aspect of your magazine that's annoying.

I own a Tandy 200 and look forward to articles in your magazine which are applicable to it. When programs written for the 100 don't have peeks and pokes, there's no problem running them on my 200. When they're present, I'm out of luck.

I'd suggest authors provide appropriate addresses for the Tandy 200 as well as the Model 100. In this manner, programs published for the 100 could be used in both computers making your magazine more useful.

*L.S. Reich
W. Orange, NJ*

Your suggestion is well taken. In fact, the subject merits an article. Stay tuned for a future issue which will contain a conversion table for peeks and pokes. In the meantime, we'll do our best to accommodate the growing number of 200 users. — Ed.

VENDORS TAKE NOTE

On page six of your October 1985 issue, Dave Keller asks for an inexpensive video interface. Manufacturers say "no demand." Well I for one have been frustrated one too many times by being locked out of many of the services and

products available to owners of Apples, IBM PCs, etc.

For example, I'd like to receive real time price quotes on stocks and commodities on my 100. All available programs are written by overpriced quote services and dedicated to the Apple, IBM and IBM-compatible machines.

Thousands of financial quote machines are in use. Executives would jump at a realistically priced computer that can go with them and has the capabilities of bigger machines. It's a mistake to think there is no demand.

Ideally, what's needed is a large affordable memory add on. Why doesn't someone produce the obvious: a bubble memory that plugs into the expansion port, outputs an 80 character signal that can be fed to an RF modulator and runs major third party programs?

In other words, I don't want to sacrifice the portability, internal software, modem and third party support advantages of my Model 100 for another computer. No demand? You've got to be kidding. Overpriced is more like it. I'm one of the top salesmen for a Fortune 300 company and all my experience and intuition says it's shortsightedness in marketing, not lack of demand.

If anyone can "home brew" something in this area, I'm interested. Or how about writing software that will decode and display one of the quote services on our machines the way they are. Please contact me.

*Ed McCabe
Lagrange, KY*

First off, there's obviously demand for a video interface because merely days after our October issue was committed to paper, Axonix introduced Thinvid for the Model 100. It's available for \$249.95. Contact Axonix Corporation, 417 Wakara Way, Suite 130, Salt Lake City, UT 84108, (801) 582-9271.

Next, the frustrations you express in your letter are certainly felt by many of your portable compatriots. Unfortunately, it's economics — not technology — that's the driving force behind product development. Although there are tens of thousands of 100/200 owners, there are several hundreds of thousands of Apple, IBM and IBM-compatible users. Which market would you concentrate on if you were a software developer?

It won't be long before what passes today as a desktop can be put on your lap. It's even available today — look at the Data General One, Hewlett-Packard 110 and other MS-DOS portables. The time will come. We just have to be patient.

— Ed.

FLEA MARKET ON-LINE

If you're trying unsuccessfully to unload that old computer system, here's a place to look: NewsNet's new Computer Multiple Listing Service (CMLS).

CMLS is an online marketplace for buying and selling computer equipment. The service supports both the placing of FOR SALE and WANT ads and selective scanning for product descriptions.

The listing service accepts any computer device by any manufacturer — wanted, for sale or for lease. And, the listing remains online until the equipment is sold or the seller decides to retract the offer.

Simple menus guide buyers through every search step. The database can be browsed by manufacturer, model number, system configuration, equipment function, location, date available, price and leasing terms. Each listing must contain the seller's name, address and telephone number, so that responses can be immediate.

A special *What's New* command keeps the simply curious up-to-date with product availability.

Users pay a small fee to list equipment on NewsNet's service, in addition to the hourly connect time. A commission is also paid by the seller to NewsNet after the sale, unless the buyer is a broker or dealer.

In addition to the CMLS, NewsNet offers online editions of over 250 business newsletters, financial quotes and an electronic "clipping service." Minimum connect time charges range from \$18 to \$24 per hour at 300 bits per second (bps). Use of 1,200-bps lines carries a 100-percent premium, and 2,400-bps carries a 200-percent premium.

For more information, contact NewsNet, 945 Haverford Rd., Bryn Mawr, PA 19010, (800) 345-1301.

Check the Book

The Complete Handbook of Personal Computer Communications is a new edition of that popular volume by Alfred Glossbrenner. The book, at 546 pages, outweighs the 324-page first edi-

tion in both size and substance. The price remains unchanged: \$14.95.

Subtitled *everything you need to go on-line with the world*, the handbook is perhaps the best value for veteran and novice telecommunicators alike. Parts of the volume — such as choosing a 300 bits per second (bps) modem and software — aren't applicable to Tandy laptop owners. But when Glossbrenner discusses the pros and cons of upgrading to 1,200 or even 2,400 bps, it pertains to everyone.

A major section of the book is devoted to a tour of online services, from CompuServe to Delphi to Dow Jones News and Retrieval. Glossbrenner describes what's available on the dozen-plus services that he covers, as well as costs and sign-up information. Anyone considering using an online service for electronic mail, software downloading, financial quotes, conferencing or news retrieval can gain an excellent overview from the handbook.

A section of the book discusses telecommunications from the home-computing angle. Glossbrenner covers shopping by modem, home banking and the widely debated subject of telecommuting.

The book closes with a discussion of do-it-yourself online service: computer bulletins boards (BBS). Glossbrenner explains the different software popularly available for creating a home or office BBS and tells what hardware's necessary for running an efficient bulletin board. He also describes several bulletin-board systems across the country.

The Complete Handbook of Personal Computer Communications is available in most bookstores that carry computer-

related publications. The book is also available directly from St. Martin's Press, Cash Sales Dept., 175 Fifth Ave., New York, NY 10010, (800)-221-7945 or (212) 674-5151.

De-Facto Standard

The computer industry loves standards. Standard operating system for desktops: MS-DOS (used to be CP/M). Standard spreadsheet program: Lotus 1-2-3 (used to be VisiCalc). Standard modem: Hayes SmartModem.

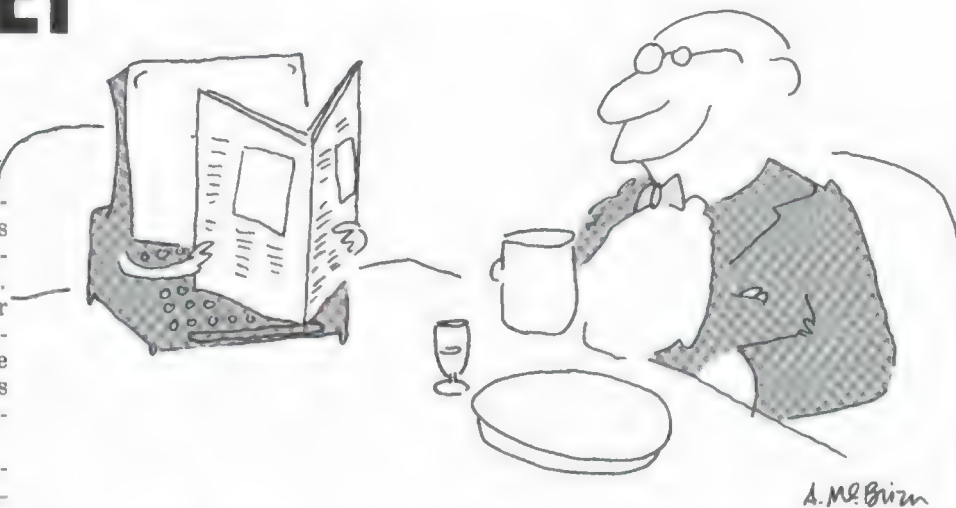
Even Radio Shack has acknowledged the Hayes standard: The new 1200-bps modem card for the Tandy 1000 and 1200 is Hayes-compatible. The earlier 300-bps modem card used non-standard codes.

When using the Model 100 or Tandy 200 internal modem, code compatibility isn't an issue. However, for laptop telecommunications software to use external, high-speed modems, program compatibility should be considered.

What does Hayes-compatible mean? In a nutshell, certain control sequences are sent to the modem to indicate which telephone number to dial, whether to use originate or auto-answer tones, or to hang up.

The Hayes standard calls for two modem operation modes: Local Command and On-Line. The modem will be in local command mode when powered up, while waiting for commands, and when dialing. When the modem is suc-

(continued on page 76)



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WHAT'S MY LINE

Datacom Northwest has introduced the Model 355 Breakout and Activity Tester. It allows full access to 34 signal lines and has the capability to switch or disable 33 of them. The unit is transparent to data and does not alter information passing through it.

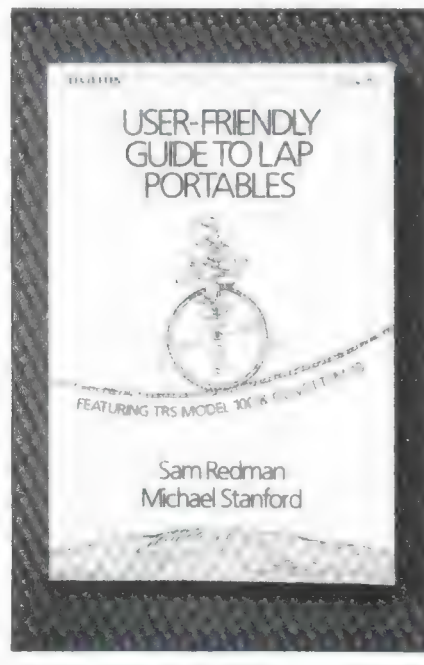
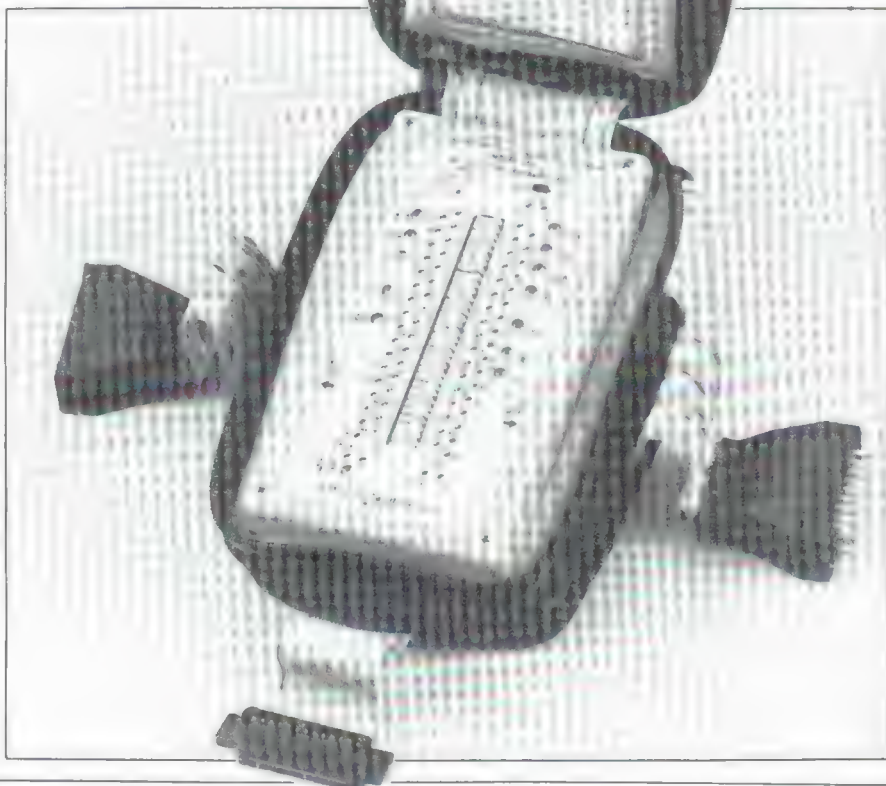
Signal level monitoring at frequencies up to 1.5 megahertz is provided by 14 bi-color LEDs. Two spare test LEDs are provided to test any control or data lines.

An optional RS-232-C monitor output converts V.35 signals into equivalent RS-232-C signals for the interface to other test equipment. Circuits driving the bi-color monitor LEDs are high input impedance and battery powered.

Attached dual cables with molded stress relief V.35 connectors are included to help eliminate the need to carry additional patch cables.

The Model 355 is available from stock. Suggested retail price without a monitor is \$645. With a monitor it's \$695. Contact Datacom Northwest, Inc., 3303 112th Street, S.W., Building 100, Everett, WA 98204, (206) 355-0590.

Circle No. 81



Friendly Reading

For those people who are new to the world of portable computing and would like a little hand holding going through the paces, this book's for you. Called *User-Friendly Guide To Lap Portables*, it gives you a detailed description of portable computers and what makes them work.

Written by Portable Computer Support Group's Sam Redman and Michael Stanford, the book explores, specifically, Radio Shack's Model 100 and Olivetti's M-10. It covers each system's five built-in programs as well as seven optional programs: SCRIPSIT or PRNT 10, DATA or DATA 10, SORT or SORT 10, TELEX +, EXPNS, GRAPH and DISK or DISK 10.

It gives step by step examples of how to use these programs and how to get the

most out of them. From explaining the function keys in TEXT to designing pie charts with GRAPH, the information is presented in plain English.

User-Friendly Guide To Lap Portables sells for \$16.95 and is published by McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020.

Circle No. 82

A Day at the Races

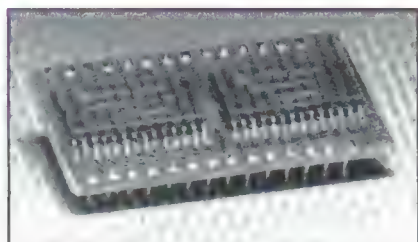
The Model 100 is used in many circles as an aid to financial planning. Now it can be used in larger, more tangible circles to *make money* — the horse track.

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Computer Analysis to Thoroughbred Racing. Written by experts, PH&\$M 105 takes results from past performances found in the Daily Racing Form, and using race conditions and each horse's data (age, sex and weight), handicaps a race in about 15 minutes.

PH&\$M 105 was designed to meet the needs of people who understand computers but not horse racing and vice versa.

Built-in qualifying rules compensate for many influential factors, eliminating races in which there is insufficient data, where two or more contenders cannot be separated on a class basis and dis-

qualifying horses in poor condition. PH&\$M 105 provides a long range statistical edge by directing you to high probability betting opportunities.

Detailed information about wagering is provided with the PM&\$M 105 program. Monetary levels can be raised or lowered to suit the individual bettor.

PH&\$M requires 32K to run. It sells for \$300. Other programs for harness and greyhound racing are also available. Contact Cannella Corp. of Florida, 1 Austin Drive, N. Syracuse, NY 13212, (315) 457-8804.

Circle No. 83



Standard Conversion

Do you need help solving incompatibilities in flow control (handshaking), data rate, data format, signal configuration or data coding? If so, you're probably not alone. That's why Quasitronics has introduced the Asynchronous Protocol Converter (APC). Since the firmware is modular and each module is selected by internal switch settings, the converter can be configured in the field.

Bidirectional data code conversion from ASCII to EBCDIC and ASCII to BAUDOT are standard to the Q-4050, as are flow control conversions between XON/XOFF, RTS/CTS, DTR/DSR and ENQ/ACK.

Current, loop or RS-232C electrical signals are supported by each port and baud rates from 50 through 19200 can be separately selected from each port. An internal buffer of 8 kilobytes (K) is standard with a 32K buffer available as an option.

Additionally, each port can be configured as full or half-duplex with word formats from five to eight data bits, one to two stop bits and odd, even or no parity.

The Asynchronous Protocol Converter is available from Quasitronics, Inc., 211 Vandale Drive, Houston, PA 15342 (800) 245-4192 or (412) 745-2663.

Circle No. 86

Telecomputing Made Easy

To most first-time computer users the thought of using a modem makes them cringe with fear. Getting over the initial trepidation of using a computer is hard enough. Doing something as complicated and technical as telecommunicating . . . well that's just out of the question.

A new book entitled *One Hour Telecomputing* from IM-Press has been published to help to alleviate those fears. Where some books might touch on the basics, this book goes into detail on what you need to know to understand telecomputing. For example, what parts are needed and why, how each part works and how they all work together.

One Hour Telecomputing also discusses serial communications, parity, duplex modes, communications software and how to connect to other computers. It has a glossary of telecomputing terms, ASCII control codes and addresses of useful resources.

The book is available for \$19.95. The publisher offers a 15 day money-back guarantee. Contact IM-Press 1412 Rosewood, Ann Arbor, MI 48104, (313) 761-2231.

Circle No. 84

Let There Be Light

What do you do if your power goes out? As a portable computer user, it's no big deal. Your machine runs on AA batteries anyway. But what if the lights go out at night. Then you might be left in the dark.

Not if you have the new Portable Light from Amro Computer Services. The Portable Light is small and battery powered so you can take with you wherever you go. It weighs three ounces and requires two AA batteries.

The Portable Light features a six-inch flexible neck to provide the needed height and angle to illuminate your LCD. It comes with a detachable suction-cup base and spring clip to provide proper lighting whether you're in a phone booth, plane, car or bus.

The Portable Light is available for \$5.85 plus postage. Contact Amro Computer Services, Dept. A, P.O. Box 1131, Tualatin, OR 97062, (503) 692-5926. □

Circle No. 85

AS GOOD AS ITS NAME



Supera

Keyboard enhancement program for the Model 100

Version 2.0

Micro Demon Inc.

P.O. Box 50162

Columbia, SC 29520

803/733-0980

\$79.95

Circle No. 81

By J.R. WILSON

There was a time, in the dim and distant past, when the first Model 100 users managed to get by with nothing but built-in programs and a somewhat less than terrific owner's manual. After what seemed an eternity, third party software began to appear; quite simple stuff at first, but with growing sophistication as time passed.

Eventually, the idea that the Model 100 was limited and only marginally useful began to fade. Users came to expect software that approached the power and sophistication of desktop packages. Today, third party vendors continue to deliver.

A REAL POWERHOUSE

One of the most useful software packages I have for my AT&T 6300 is Prokey by Rossoft. The Rolls-Royce of keyboard enhancers, it allows the PC owner to customize virtually any program to fit personal quirks and applications.

Indeed, I was so happy with Prokey I asked the folks at Rossoft if they would consider a similar keyboard utility program for the Model 100. They didn't seem interested, but someone else obviously had the same idea.

Enter Micro Demon and their latest offering, Supera. Supera is a second generation program, having grown out of Micro Demon's Texpro, which essentially is a downsized precursor that offers keyboard enhancement capabilities in the TEXT mode. Supera offers all of those, but in BASIC and TELCOM as well. It also has a Calculator function (which, unfortunately, can be summoned only from BASIC).

Micro Demon proclaims installing Supera in your Model 100 is "like getting

a new computer." What it really is, though, is a way to tap the real power that always has been present but Tandy didn't bother to use.

Some fundamental features available with Supera should have been built into the 100 in the first place. For example:

- A type-over mode, allowing you to choose whether new text is inserted in front of existing text or simply replaces it.

- Ability to rename files, kill files or get file status at the main menu.

- The aforementioned calculator.

- Automatic line numbers in BASIC.

- Automatic scrolling (up or down) and true search and replace in TEXT mode.

- Direct access to TEXT, TELCOM, ADDRSS and SCHEDL from BASIC.

These are all useful and time-saving functions, but they are, in fact, only the icing on the Supera cake. The program's real power is in the ability to create macros, defining most of the individual keys to perform specialized tasks.

For example, in writing this review, I didn't want to use the eight-character built-in tab for paragraph indentations. Neither did I want to bang out five spaces at the beginning of each paragraph with the spacebar. So I created a function key — ESC T — to handle the task. Each time I begin a new paragraph, I simply hit the ESC key and the letter T, — and the cursor moves over five spaces.

SOME DOS AND DON'TS

One note of caution. The folks at Micro Demon, much to their credit, go to extraordinary lengths to warn the user about potential dangers in this program. For example, they emphatically tell you not to try to kill Supera while it's in the active mode. Do so and, in their words, "(Supera) will take its revenge upon you like Hal in 2001." A similar fate awaits anyone who tries to tinker with the program. Adding even a space to a line of code can give you a cold start.

You also are warned to remove all other BASIC files before attempting to load Supera. Failure to do that is far less drastic; the program simply won't load

and beeps a message telling you to clear out the other BASIC programs.

Loading Supera is quite simple. After removing all other BASIC programs, just type in RUN"CAS:LOADER" and hit Enter. The tape will then run forward until it finds the appropriate version for your unit, based on whether you have 16 kilobytes (16K), 24K or 32K of random access memory (RAM). At least 24K is recommended. Once it locates the right version, the computer loads it and returns you to BASIC. A new file, SUPERA.BA, can be found taking up 4.25K of RAM.

A couple of notes on expansion chips and Supera. Supera must be loaded into each bank individually from tape — the SUPERA.BA file *cannot* be transferred.

To turn Supera on, just place the cursor bar over SUPERA.BA in MENU and hit Enter. The screen will blink, then return you to MENU, where you will see the Model 100's BASIC and TEXT files replaced by BASIC+ and TEXT+. Hitting SUPERA.BA again turns the program off and returns BASIC and TEXT to their original appearance.

To avoid a disastrous accident, it is advisable to use immediately the name changing capability — CTRL N — to rename SUPERA.BA to something that cannot be killed, such as +SUPRA.BA (the Model 100 does not recognize a file name that does not begin with a letter).

Using Supera, you can rename files to anything you wish. However, the program *doesn't* check for duplicate names, so be careful not to use a file name twice.

Other functions available from MENU include KILL (CTRL K) and STATUS (CTRL A), which gives you the memory location and length in bytes. Another function, CTRL Z, is used to load a pre-defined keyset.

SIMPLE POETRY

Supera's macro function enables you to define up to 26 new function keys, the uses of which are limited largely by your own imagination. Each newly defined key can handle a string of up to 14 characters. Longer strings are possible by using the last two slots to call up another function key.

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First, LUCID[®] is memory conserving. It will let you build a large spreadsheet—255 row by 126 column capacity. You build huge spreadsheets in your Model 100's RAM that could consume 80 to 100K on a desktop computer.

Secondly, LUCID[®] is fast. LUCID[®] is so rapid, a 36 column corporate financial statement took less than 4 seconds to calculate.

Thirdly, LUCID[®] has features you won't find in most other spreadsheets. For example, when you type a label (text) it will cross column boundaries; in other words when you type a label or title it will appear as you type it irrespective of column or width. LUCID[®] also allows you to set column widths individually, and of course LUCID[®] has insert row and insert columns, as well as other standard features. LUCID[®] even lets your formulas refer to cells in other spreadsheet files.

Further, LUCID[®] has what no other spreadsheet has: Cut, Copy, and Paste. It uses the same keys as Cut and Paste in TEXT, but here's the difference: it takes all the formulas with it when you paste and they all automatically recalculate with the entire sheet.

And here is what is really amazing. You can copy or cut from one spreadsheet and paste into another spreadsheet or even a TEXT file.

LUCID[®] supports all BASIC math functions as well as Log, sine, cosine, tangent, exponentiation and other sophisticated math functions.

LUCID[®] has so many features that you will say "this is what I need in a spreadsheet", such as automatic prompting of an incorrectly typed-in formula showing just where the mistake was made.

LUCID[®] has expanded "go to" functions that remember and produce a windowing capability.

But perhaps most remarkable is that LUCID[®] is not only a spreadsheet but a program generator as well. First, LUCID[®] lets you protect all cells against entry or change, and then unprotect just the cells you want for someone else to use as input fields.

LUCID[®] will not only process values, but text input as well so that the facts other than numbers can be responded to. LUCID[®] has the ability for you to refer in a formula to cells containing words. This feature combines with the capacity of doing "if then" statements that work by doing table look-ups against even massive X/Y charts of text or numerical information. You can produce a program that responds to inputs with no programming knowledge whatsoever.

You can prepare a report section in your spreadsheet with instructions to your user for printout, and they can produce a personalized printout that responds to their input. All your formulas and tables that did the calculations and provided the facts are invisible to that user. LUCID[®] is useful for doctors for patient questionnaires, troubleshooting technicians, purchase clerks, people doing job quotes, stores for customer workups, insurance agents and anybody who needs to process specific facts and numbers to produce a report based on those responses.

LUCID[®] comes with a manual that explains not only the characteristics of LUCID[®] but will train you how to use a spreadsheet even if you have never seen one before. You are shown how to do budgets, forecasts, breakeven analysis amortizations and many other types of personal and business reports and calculations.

User friendly is such an over-used term in this industry, but a typical comment has been "I have never seen a spreadsheet that does so much, and yet LUCID[®] is so much

easier and faster to use."

LUCID[®] is a result of a most exhaustive developmental effort in which PCSG's objective was to develop a spreadsheet that was better than the state-of-the-art. We are so pleased because LUCID[®] provides for the Model 100 spreadsheet capability you cannot equal on a desktop computer.

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For example, if you want the "R" key to print out "Roses are red," you'd press ESC 4, respond to the key query with "R" and to the string query with the phrase. If, however, you wanted it to add "violets are blue" you would need to link three control keys together. The string for "R" would be: Roses are re(ESC V). ESC V would appear on your display as "[v" and would command the computer to go immediately to control character V.

Because you have filled all 14 slots available, as soon as you type the V, you will be asked to designate a new key for definition. Press V and continue the string with: d, violets a(ESC B). The KEY prompt will come up again; press B and type: re blue.(ENTER)(ENTER). This will take you back to the TEXT mode.

If you now press ESC R, you'll get: Roses are red, violets are blue.

From BASIC, a function key can be activated by holding down ESC and pressing the appropriate letter key or, if CAPS LOCK is on, holding down SHIFT while pressing the other key. In TEXT, only the ESC version is used. In TEL-COM, ADDR5 and SCHEDL, only the SHIFT with CAPS LOCK is used.

You should keep in mind that if you define a key to perform a specific task in TEXT, the same task will be performed by that key in any other mode. Generally, you won't need the same set of functions for word processing that you might want for a spreadsheet or to write a program.

Supera simplifies this for you by allowing the user to install specific keysets for each need. For example, you can set up special functions in BASIC to make program writing easier. Supera already has done most of that with its built-in ESC and CTRL key combinations, so it would be best to save this initial keyset — with any personal contributions you want to make — first.

To save a keyset, just press CTRL L in BASIC. When you return to MENU, you'll find a new file, KEY.CO, which contains all your function keys. Use CTRL N to rename that file as BAS-KEY.CO or whatever other designation applies.

You now can repeat the process for your word processing needs, setting up special function keys to handle printer control codes or boilerplate phrases or paragraph indentations. Once you have what you need, go back to BASIC, press CTRL L and, again, you'll find KEY.CO in MENU. Rename this one as WORD.CO or whatever.

To load a particular keyset, simply place the cursor bar over the appropri-

ate file in MENU and press CTRL Z. You can install as many keysets as you wish, perhaps including special ones for use with CompuServe or Dow Jones as well as the word processing, BASIC and spreadsheet versions. You can even put in different keysets for different word processing applications — one for correspondence, one for report writing, one for lists, etc. Each keyset takes up 464 bytes of RAM. If you have a 32K, 64K or 96k expansion chip, you might want to keep all your keysets in one bank and move them to the user bank as needed.

WHO YOU GONNA CALL

One function missing from the Supera program that would have been most helpful is a direct access HELP file. You can, however, overcome this by creating your own HELP file and designating an ESC key sequence to access it (ESC H, for example). If you have a number of keysets, you might want to specify them as HELPW.CO, HELPB.CO, HELPS.CO (word processing, BASIC, spreadsheet), etc.

Just be sure to use that extra letter in setting up the ESC H key in each keyset.

Making ESC H access your new HELP file is accomplished by taking advantage of another capability offered by Supera in the TEXT mode: continuous TEXT. Basically, with continuous TEXT on, when you press F8, rather than returning to the main MENU, you're given a list of all files in the MENU and asked which one you want. Typing in the new file name takes you directly to that file. If no such name exists, a new file is created.

To access a HELP file, you press ESC 4, which will ask which key you want to define. Press H. You then will be asked for the string. Press the F8 function key (two left brackets, [[, will appear in reverse video), then type HELP, press SHIFT ENTER (an M will appear in reverse video) and then ENTER. Supera will ask if you want to define another key; press ENTER to exit the function.

After that, pressing ESC H (you don't need to capitalize the H) will take you directly to the HELP file you set up.

ONE FOR ONE

Supera also offers you some single-key special functions. In TEXT, the special keys are [, =, - and /. In BASIC, the TAB, [and ' are available. These enable you to use seldom-needed keys for more frequently required functions that require either a SHIFT-Key or CTRL-Key combination.

For example, Supera enables you to change the case of any letter with CTRL

K in TEXT. If you want to make that a single function call, press ESC [. When asked for the string, press CTRL K. You get no response, but if you then hit the left bracket key, [, whatever character the cursor is on will change case.

Another example would be the quotation mark ("), which you probably use far more than the equal sign (=) in word processing. Press ESC =, then respond to the STRING prompt with SHIFT ". After that, pressing = will give you ".

The original value of these special keys is not lost, however. Simply press CTRL-Key and the default definition appears. The original values are restored completely to all special keys by pressing ESC 5.

GOOD WITH FIGURES

The Calculator mode available in BASIC is more than you might expect. Naturally, it performs the primary calculations of addition, subtraction, division and multiplication. The special keys are predefined so that ESC produces +, TAB gives you - and 'produces ^'. The latter is used for exponents (2 ^ 5 is two to the fifth power). The / is used for division and * for multiplication.

More complex computations can be handled by assigning formulas to function keys, using those keys then to evaluate the formula with a single stroke. For example, while in BASIC, you could assign trigonometric functions, such as sin(X) to the S key, cos(X) to the C key and tan(X) to the T.

Then enter Calculator mode (CTRL K from BASIC) and type in the value of X (X=25) and press ENTER. Be sure CAPS LOCK is on, then press SHIFT S ENTER, SHIFT C ENTER and SHIFT T ENTER. The sine, cosine and tangent of X will be printed out.

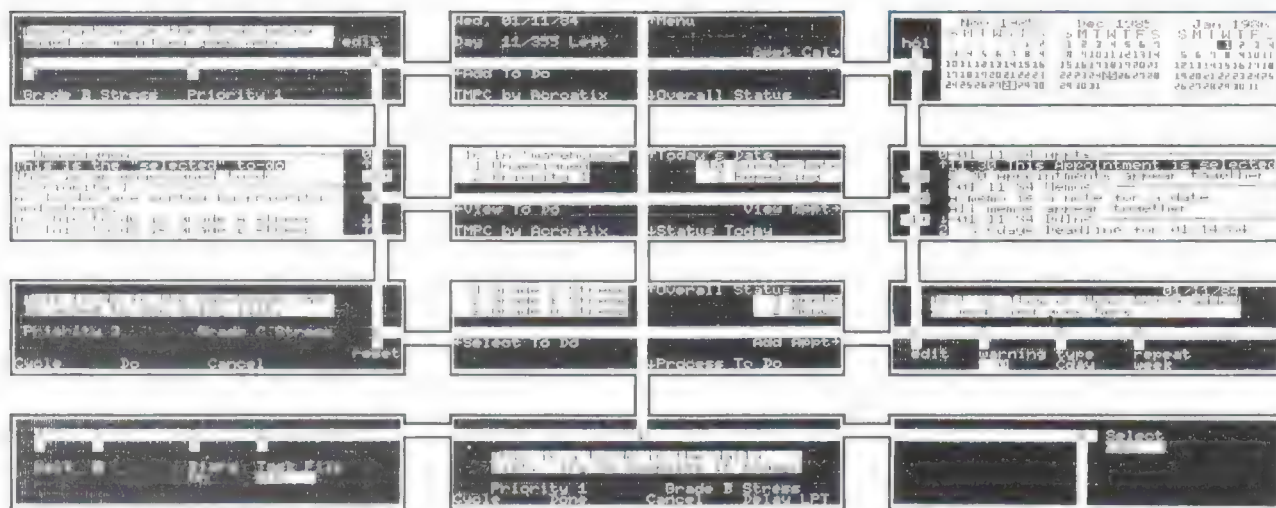
Obviously, this becomes much more useful with complex formulas. For example, if you had a formula that read Q=SQR(X)/15-7^5, you would need only type in X=15, ENTER, SHIFT Q to get the answer (assuming you placed the formula in Q).

The Calculator mode also offers some other capabilities that will prove useful to some, meaningless to others. For example, multiple PEEK allows you to look at the contents of any number of consecutive memory locations starting at a specific point. For example, PEEK 4000,10 would give you the contents of 10 memory locations, starting at 4000.

You also can insert values into consecutive locations with multiple POKE. For example, if you wanted to put the values 15, 36, 28 and 92 into memory locations 60001-60004, you would use

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screen includes a perpetual calendar, and another shows a "warehouse" of tasks to be done. In other screens you can set entries that repeat weekly, monthly, quarterly or yearly; request a warning of up to 999 days for any entry; sort your to-do list by stress level and priority; and more.

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Exp. Date _____

REVIEWS

the command POKE60001,15,36,28,92. That command could be verified with PEEK60001,4.

One handy capability is the hex to decimal conversion. Typing [H and then a hex integer will give you the decimal equivalent. For example, [H 6FDE would produce the decimal equivalent 28638. In turn, using [D and the decimal value provides the hex equivalent.

AND THERE'S MORE

Supera offers a manual powerdown, activated by CTRL V in BASIC or ESC 0 in TEXT, that returns you to exactly where you were in whatever file you were working on when you shut down. This can be handy if you are interrupted in the middle of an edit and want to return to your end point without searching for it.

Unfortunately, with a RAM expansion chip, powering down from any but the resident bank leaves you in the MENU of the resident bank when you power up again. You do return to the edit point when you key yourself back to the appropriate bank, but that would happen even if you simply turned the computer off with the power switch.

Supera's advanced Search and Replace function in TEXT is a welcome addition for writers. This feature is assigned to F4 (normally not used in TEXT) and offers you the options normally found in advanced word processors. You can specify case matters (find all instances of "Time," but skip "time"); replace with another string or delete without replacement; start search from cursor location or top of document; automatically replace or be prompted for action at each occurrence. The operation can be ended at any time by pressing the "Q" key.

Supera also offers a wildcard function, enabling you to use the underline character instead of specific characters in a search string. For example, "l.e" would locate tide, time, tile, tree, true, etc.

A number of editing functions also are available in TEXT. GRPH CTRL A deletes the word to the left of the cursor, GRPH CTRL F the word to the right. Other combinations delete line left, line right, all text to beginning, all text to end. In each case, the deleted text goes into the paste buffer and can be easily restored, providing a form of "undo" capability. You also can view whatever text is in the paste buffer by pressing ESC 3.

There are many more capabilities in Supera, all described with fair clarity in the 70-page manual accompanying the program. Some portions of the manual

are a bit confusing, however, and occasional lapses occur that can lead you down a dead-end path. Overall, the manual is slightly better than average.

But even the manual doesn't cover what the user's imagination can create with the new power offered by Supera. □

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Circle No. 83

By PARK M. MORRISON

Like many portable users, I discovered the true limitation of a laptop the day after bringing it home. I turned it on and found the low battery light really means what it says. A little while later, I was bereft of computer.

It was a harsh reality. Four little AA batteries had cost me about \$3. If I was going to go through them at the rate of four every couple of days, I'd need to rob a bank or two to get me through the year.

Of course there's always the adapter. But I got my computer for its proclaimed portability. Outlets are neither always handy nor convenient. I needed longer-lasting AAs or a battery pack that didn't decrease my machine's mobility.

Despite manufacturers' claims, no one has invented what most laptop users would consider a long lasting AA battery. But someone has developed a good, take-it-with-you-anywhere battery pack.

EASY INSTALLATION

The Power-200 from A.R.M.S. is as long as the Tandy 200 is wide. It's a five cell nickel cadmium (nicad) battery strip enclosed in a black vinyl casing. The whole thing is ten inches long and only a half inch in diameter. It weighs about seven ounces. Actually, it looks more like a wand than a power supply.

The true genius in this battery pack design is its light weight. Because of this, the Power-200 can be attached to your computer without adding heft or



The A.R.M.S. Power-200 attaches to the back of your portable using velcro strips.

bulk. Two velcro strips are used to "stick" the battery to your computer. On the Tandy end, one strip is placed over the printer port and one about over the RS-232 port.

The battery case already has corresponding velcro strips. To attach it just match the strips and press. The "connection" at first seems flimsy. But it takes fairly vigorous shaking to make the battery come off. You're more likely to damage the computer than lose the battery.

At one end of the battery are two plugs. One is a male connector, the other is female. The former plugs into the DC 6V connector. If you've attached the battery correctly, there's more than enough slack to make this connection easily.

The other plug is for recharging the battery using an adapter. It's a pretty snug fit, so you have to make sure the adapter's plug is in as far as it will go to insure recharging.

According to the manufacturer, the Power-200 provides 11 hours of power to the Tandy 200. It also runs other devices that have the same connector, polarity and voltage. A partial list is shown below.

I didn't find the actual run time for the Tandy 200 to be any different than claimed. Under true working conditions, I found it sufficient to get me through the day and at night, I connected it to my adapter. This is a good habit to cultivate if you have a rechargeable battery pack.

An added feature of the Power-200 is that it can be recharged while connected to your computer. You should be aware, however, that you won't reach a 100 % charge this way.

It takes about 16 hours to completely recharge a dead Power-200. However, according to A.R.M.S., because charging is not linear, you actually achieve about 70% of a full charge in the first five hours.

If you're looking for portability and price, the Power-200 is an ideal solution to the AA battery blues. It's virtually transparent to the user. Attach it to your computer and carry it around — you can't tell it's there.

It can provide enough power to last a full working day. If you want more, buy another Power-200. It'll still cost you less than larger longer-lasting batteries. □

Figure 1.

DEVICE	POWER-100	POWER-200
Chipmunk	30 min.	40 min.
TRP-100 Printer	30 min.	40 min.
Model 100	10 hours	13 hours
Tandy 200	8 hours	11 hours
CCR 82 Recorder	4.5 hours	6 hours
Olivetti M-10	10 hours	13 hours
NEC 8201	10 hours	13 hours
Tandy Disk Drive	1.25 hours	1.5 hours

Model 100/200 - NEC PC 8201A

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Circle 8 on Reader Service Card

The Model 100 Meets the Cordless Phone

Don't tie yourself down with a desk phone. Get mobile. Go cordless.

By Jim Gove and Chris Leddy

A Model 100, with its built-in modem and telecom software, makes the world of computer telecommunications easily accessible. As long as there's a phone line handy, you can be in touch with the world. But there is one limitation. You need access to a telephone wall jack.

The telephone industry has thoughtfully provided a means for freeing telephone users from this "wall connection." Cordless telephones hook to your belt and let you make calls while puttering around the back yard. They're becoming increasingly popular and some have fairly respectable ranges. And the price is coming down, too.

It was only logical to extend this same freedom to a Model 100. If the built-in modem could be connected to a cordless handset, the machine's portability would increase.

FEASIBILITY FIRST

First we had to see if data transfer was possible over a cordless phone. Using acoustic cups, we found it was. Data moved quickly and effectively to and from a local bulletin board. But we really wanted something that was easier to use and more permanent. It was obvious that an internal connection was necessary.

The project seemed simple enough. After all, the Model 100 has a connector that, with the 100 switched to DIR, or direct, allows the modem to be connected directly to a telephone modular jack through a direct-connect modem cable. Difficulty arises, however, with what the telephone industry refers to as "two-wire" and "four-wire" transmission.

The basic telephone is a two-wire device, which simply means that the user talks and listens over the same two wires. Radio transmissions used in a cordless telephones are by nature four wire circuits. Transmission is via one frequency and receiving is on another. This makes it possible for two parties to talk at the same time. More to the point, it allows virtually instantaneous switching from talk mode to listening mode during a conversation.

The direct mode on the Model 100 is set up for the two-wire interconnection

Figure 1: The Two-Wire Circuit.

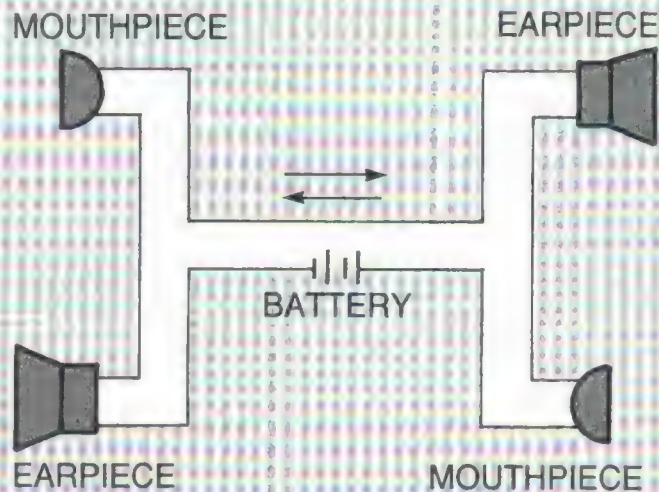
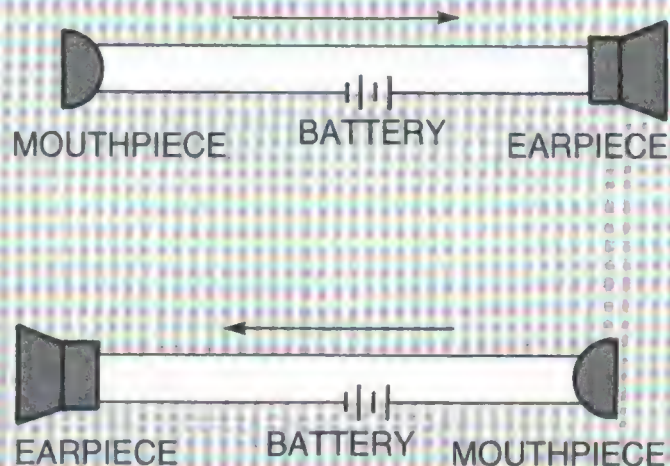


Figure 2: The Four-Wire Circuit.



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WRITE ROM is the definitive word processing extension for the Model 100. PCSG produced the first text formatter for the Model 100, now sold by Radio Shack as Scriptsit 100. Now, 18 months later, PCSG introduced WRITE ROM. Those who have experienced it say WRITE ROM literally doubles the power of the Model 100.

WRITE ROM — as its name implies — is on a snap-in ROM. You simply open the little compartment on the back of the Model 100 with a quarter and press WRITE ROM in. It's as easy as an Atari game cartridge. You can use other ROM programs like Lucid whenever you wish.

WRITE ROM lets you do every formatting function you'd expect, like setting margins, centering, right justifying and creating headers and footers. But it does them under function key control.

WRITE ROM remembers your favorite format settings so you can print a document without any setup, but you can change any formatting or printing parameter instantly with a function key.

WRITE ROM's "pixel mapping" feature shows you an instant picture on the screen of how your printout will look on paper.

In all there are 64 separate features and functions you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formatted or not) to any other computer over the phone with just a function key. What's more, it dials and handles sign-on and sign-off protocol automatically.

Third, WRITE ROM has a wonderful feature called Library that lets you record favorite phrases, words or commonly used expressions (often called boilerplate).

Any place you wish Library text to appear you just type a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer. Picture what you can do with that kind of capability.

WRITE ROM is blindingly fast. No one can claim faster operation. Because it is on ROM it uses virtually none of your precious RAM. It works with any printer, serial or parallel. You can make a duplicate copy of a document file under a new filename. Rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of this amazingly powerful piece of software. Dot commands allow control of such things as margins, centering, line spacing and other changes in the middle of a document. Most are WordStar™ compatible.

A mailmerge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature like superscripts that your printer supports, in a way that many users say "is worth the price of the program."

To underline you don't have to remember a complicated printer code. You just type CODE u, and to stop underline, CODE u again. The CODE key is to the right of your spacebar. Boldface? CODE b to start and stop. Easy to remember and do. Five different printer features of your choice.

We couldn't list all the features here. For example, you can select not just double space but triple or any other. You can use your TAB

key in a document. WRITE ROM allows you to indent. This means you can have paragraphs with a first line projecting to the left of the rest of the paragraph. WRITE ROM has a feature unique for any word processor on any computer. It's called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms or questionnaires.

With FORM, any place that you had previously typed a GRAPH T and a prompt in a document, WRITE ROM will stop and show you that prompt on the screen. You can type in directly on the screen and when you press F8 you see the next prompt. It goes to a printer or a RAM file.

Think how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could use it for his entire questionnaire. You could construct a series of prompts to answer correspondence, typing the answers, even using Library codes. This feature lets you answer letters in rapid-fire fashion, each with personalized or standard responses.

Before WRITE ROM you had to be a programmer to create a series of prompts. Now it's as simple as GRAPH T.

PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature-rich formatter for the Model 100. We're happy to offer WRITE ROM because it expands the 100 to a dimension of text processing you cannot equal on even larger computers.

We brashly state that WRITE ROM is the best you can buy. But put that to the test. If you aren't as excited as we are, return it for a full refund. Priced at \$99. on snap-in ROM. MasterCard, VISA, American Express and COD.

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Figure 3: Connecting acoustic cups to a cordless telephone.

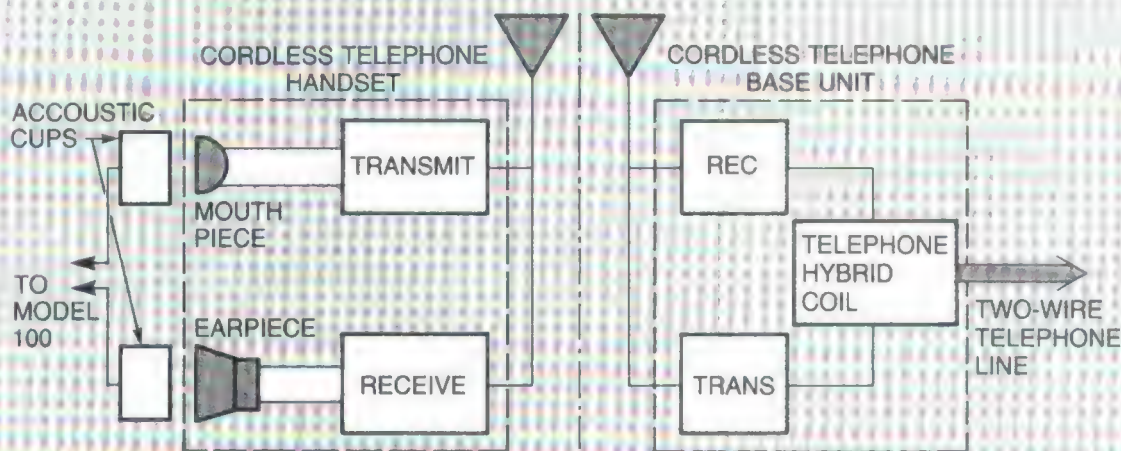


Figure 4: Cordless telephone handset modification.

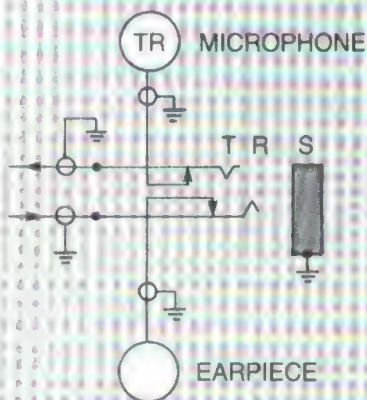
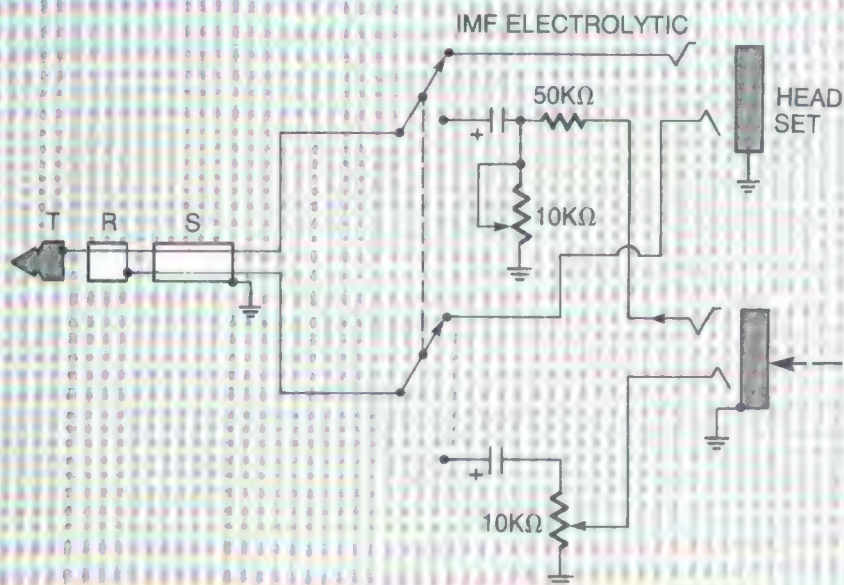


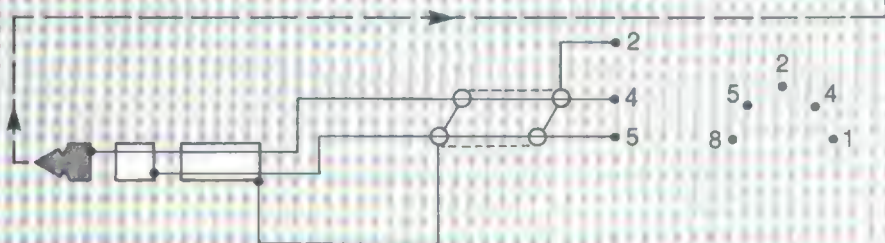
Figure 5: The cordless interface. Actual polarity will depend on configuration of telephone to be modified.



to telephone lines. The acoustic cup configuration on the Model 100 is set up for a four-wire interconnection on an acoustical basis. It was obvious that if the acoustic cup configuration were used, there would be no difficulty in deriving a four-wire connection.

We designed a circuit that made use of the phone connector on the back of the Model 100. The parts used in the prototype unit, without exception, were obtained from a local Radio Shack store. The only part that presented any difficulty was the eight pin male connector that plugs into the 100's phone jack. We had a set of acoustic cups and a direct-connect modem cable, so the interconnect configuration was easy to come up with. After spending several days trying to locate an eight pin male connector, the direct-connect modem cable was sac-

Figure 6: Wiring diagram for eight pin male connector.



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Computers for the Severely Disabled is a Chapter organization of Easter Seal Society of Santa Cruz, California. CFSD operates a bulletin board for the disabled and the cordless interface described was developed for use by John Grammer on that bulletin board.

The interface is an integral part of John Grammer's work station which is based around a motorized wheelchair. With this unit, John has the ability to move around his home, operating his computer station either as a computer, as an interface into bulletin boards or as a direct link to another modem connected computer.

CFSD believes that computers can be used to enrich the lives of individuals whose mobility has been severely lim-

ited, and bases its activities on this premise.

John Grammer's Model 100 keyboard is adapted to use with a mouthstick by converting special keys so that they lock. A Nevada man read a letter from John in *Portable 100* requesting help in adapting computers so that they could be used by the severely disabled, and he now helps CFSD by altering keyboards. Model 100's adapt to wheelchair use much better than Model 200's, so if you've upgraded and no longer have a use for the old 100, CFSD will accept it as a donation.

CFSD began as a fund-raising campaign started by Paul Bailey and Kay Truesdale, who was then director of the Santa Cruz chapter of the Easter Seal

Society. Its purpose was to get enough money to buy a computer for John Grammer. There was so much response that a fund was started to place more computers with more severely disabled persons. These computers have been found to help the disabled adapt, and to increase their ability to communicate and be active in their communities.

Warren White, Ray Brindos and Wayne Maxey of San Jose State University designed and built the equipment which holds and supports the computer equipment in its wheelchair attachment.

Any donations of equipment for CFSD should be made to Easter Seal Society, P. O. Box 626, Santa Cruz, CA 95061.

—J.G. & C.L.

riticized, which made the connector, at \$19.95, a very dear component.

The interface itself was built into a Radio Shack enclosure and PC board. The circuit is quite simple and consists of an impedance matching circuit and a

simple level control for each direction of transmission. There's also a switch that switches the telephone signal either to the computer or to a small headset. The polarity of the electrolytics will vary with the choice of the cordless telephone

(the unit shown is a Western Electric unit) and should be determined either by experimentation or with the use of a voltmeter.

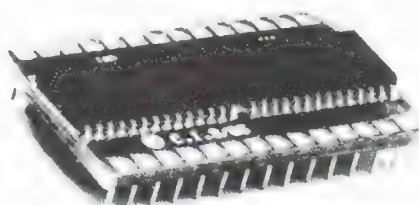
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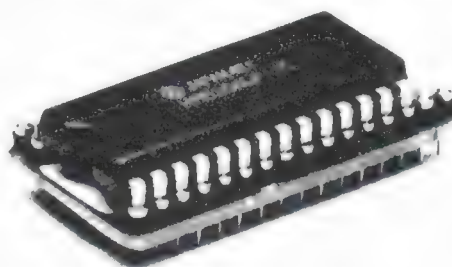


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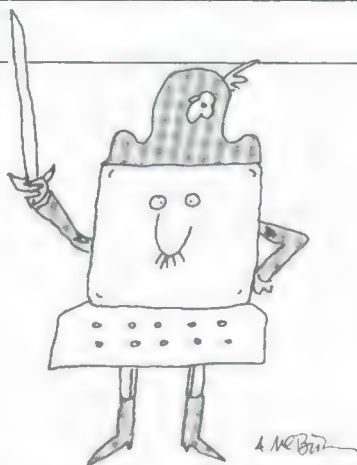
CORDLESS

the cordless telephone. This is because it's usually is highly packed with electronic components. The actual circuit modification is quite simple. A miniature Tip-Ring-Sleeve jack with normally closed contacts is used. The wire from the handset microphone is broken and wired through the tip circuit of the jack. The wire leading to the receiver is likewise broken and wired through the jack's ring circuit. In this way, the cordless telephone works normally when nothing is plugged into the jack. When the cable from the interface is plugged in, the telephone receiver and transmitter is disabled (to prevent interference to the data signals and to maintain proper impedance to the interface).

In the unit shown, the cable connection from the interface to the cordless telephone set is permanent. This can be jack connected if the builder so chooses. In any case this cable, and the cable to the computer, should be shielded.

The cable from the interface to the computer is configured using an eight pin male connector and a Tip Ring Sleeve jack wired as shown in Figure 6.

In setting up the unit, the settings of the 10 K potentiometers are determined through experimentation while con-



nected to a bulletin board or to another computer via telephone lines. Also, when the unit is connected to the cordless telephone, the Model 100's modem switch needs to be in the "ACP" position.

WHAT TO WATCH FOR

Two difficulties have been experienced with the unit to date. The first is a "phasing" problem having to do with the operation of the cordless telephone. In its field of operation, there are locations where there are what amounts to standing waves. These manifest themselves as distortion, and disrupt data transmission. This problem is handled by slightly

altering the position of the cordless telephone handset when a "phasing" problem is encountered.

The second problem is that with some headsets, there is a slight degradation in the level of transmission to the headset receiver when switched for voice communications. This can be rectified with the addition of an audio chip. The interface, as configured here, produces adequate sound for users with normal hearing. The advantage of the present configuration is that it requires no power to the interface. With the addition of an audio chip, a battery source would need to be considered.

This is our unit. A prototype has been in use by a quadriplegic for six months now with some success.

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Shaking Hands With Your Tandy 600

By Carl Oppedahl



ILLUSTRATION BY DOUGLAS COFFIN

The old TRS-80 Model I computer, which had served me faithfully for many years, was getting more and more erratic in its operation. Stored on its increasingly vulnerable floppy disks was a thousand-record data base of names and addresses which I had kept updated over the past six years. Sure, I always kept backup copies, but sooner or later the Model I itself was going to give up completely. I knew that my brand-new Tandy 600 would keep names and addresses in a database, but didn't relish the idea of hand-typing all the old data into the new machine. Clearly the smart move would be to transfer the data from the Model I to the Tandy 600.

Figuring out how to transfer the data wasn't easy, but after I got the bugs worked out, I was able to save the data base. In this article I'll describe how to transfer files via the RS-232 interface, and you'll be able to apply the same techniques to other problems. More important, I'll tell you what went wrong along the way, to illustrate the pitfalls you're likely to find if you set out to interface with some other machine.

The Tandy 600, like its predecessors the 100 and 200, has an RS-232 inter-

face. On each of the three models, there's a familiar DB-25 female connector at the rear of the unit. The computer transmits data on pin 2 and receives data on pin 3.

A null-modem cable can connect two such machines. It swaps the line-2 and line-3 signals. The Model I's RS-232 interface has a male connector and a switch (labelled COM/TERM) allowing you to swap pins 2 and 3, so no straight cable is ever needed. When connecting the Model I to the 100, 200 or 600, plug the Model I RS-232 cable directly into the rear of the portable, and set the switch to the COM position.

Next you must match up the baud rates, word length, etc. between the two machines. The 600 only allows such settings within the TELCOM program. This is in contrast to the 100 and 200 in which a COM: or MDM: specification setup may be performed in BASIC or TEXT. The Model 100 configuration, whether in TELCOM, TEXT or BASIC uses a five character string such as M7I1D (for modem communications) or 88E1E (for high-speed RS-232 data flow). The first character determines whether the built-in modem (the "M" in M7I1D) or the RS-

232 interface (digits 1-8) will be used, and selects the baud rate.

In the examples given, "M" selects 300 baud, while 8 selects 9600 baud. The next digit determines the number of data bits (6, 7 or 8); the next character selects parity (E, O, N, or I for even, odd, none or ignore, respectively). The next digit determines the number of stop bits (1 or 2) and the final character selects XON/XOFF protocol (E) or ignores it (D).

The 200 adds two more characters to the setup string. A typical RS-232 sequence would be 88E1ENN, where the first N turns off a filter that would remove control characters, and the second N turns off the automatic provision of line-feeds after carriage returns. The letter Y turns on either feature. (These added N's will cause trouble if you attempt to transport a BASIC program containing OPEN"COM:" or OPEN"MDM:" statements from the 100 to the 200 or vice versa. Be sure to add or delete the two N's as necessary.)

The 600 spreads out the baud rate and configuration information into a four-line submenu (the "modify" submenu of TELCOM) which requires you to use the TAB key to move from field to field until

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everything is correct. Then you push Enter to fix it. Although the initial setup is clumsier, it need only be done once since the configuration information may then be stored to a file along with the phone number and name of the distant device. Typical communications choices in the modify submenu are: Baud (9600), stop (1), word length (8), parity (even), XON/XOFF protocol (on), duplex (full), terminal (no), add to EOL (none), strip linefeeds (no) and filter control characters (no). The duplex selection corresponds to the 100 or 200 TELCOM function key F4 which selects half or full duplex when online.

Oddly, there's no way to include with the configuration information a request that the RS-232 port be used rather than the modem. Instead, every single time an RS-232 connection is to be made you must use a couple of extra keystrokes to select the RS-232 port. In the 100 and 200, on the other hand, a "Stat" string beginning with a numerical value rather than "M" selects the RS-232 port, and the selection remains in force until the Stat string is changed.

ERROR CHECKING

If the information you're transmitting is plain text which will be subjected to further proofreading, you may not care much about error checking. But it is really no trouble at all to use parity to reduce the number of undiscovered transmission errors. Just set both computers to even parity. When the Tandy 600 receives a character with a parity error (or overrun or framing error) it displays and stores the character as a tilde. (The 100 and 200 display the character as a half-shaded block.)

As mentioned below, TELCOM in the 600 can also do error checking through the XMODEM protocol.

Strictly speaking, XON/XOFF is not an error-checking protocol. Rather, it is a method by which a receiving computer can request that the transmitting device suspend transmission momentarily. The usual situation calling for XON/XOFF is when the receiving computer has no trouble receiving data at a particular baud rate, but must occasionally hold off receiving while storing the most recent 256 characters to disk. The receiving computer simply sends a CTRL-S to stop the other computer momentarily, stores the text to disk, and then sends a CTRL-Q to signal that transmission can continue.

It should be obvious from this discussion that XON/XOFF will only work if both computers pay attention to the standard. It turns out that under certain

conditions the Model 100 and Tandy 200 do not pay attention to the standard, even when told to do so.

The problem XON/XOFF is designed to solve is the occasional slowness of the receiving device. If, for example, the receiving device has an LCD screen that simply cannot keep up with 19200 baud, the preferred cure is not to use XON/XOFF to keep from losing characters. Instead, a lower transmitting baud rate should be used, one that the screen can keep up with.

With a 300-baud screen and 20 kilobytes (K) of incoming data at 19200 baud, it's likely more than a thousand CTRL-S's and CTRL-Q's will be sent. Every so often a CTRL-S will get lost, and the transmitting device will keep sending during an interval in which the receiving device cannot keep up and characters will be lost. It's best to set both machines to 300 baud. Because there is a little buffering at the receiving end, it may easily work out that the XON/XOFF capability never gets used, or gets used only rarely.

THE SOFTWARE

The 100 and 200 operating systems, which are virtually identical, allow three quite different and versatile routes for data flow in and out of the RS-232 port. Most obvious, of course, is Telcom, where a Stat setting starting with a numerical digit selects the RS-232 connector and the F2 and F3 keys may be used for uploading and downloading of data files. (By "uploading", we mean transmitting a file to some other device. The receiving device is said to be "downloading".) Less obvious, perhaps, but clearly described in the manual, are the use of the F2 and F3 keys in TEXT. For example, while you are in a text file, you may push F3, which yields the query "Save to:". Most often a user will give a simple six-character filename, and the file will be saved to cassette. But if the filename specified starts with "COM:" or "MDM:" then the file will be transmitted to the RS-232 port or to the modem. In either case the limit on the size of the file to be sent or received is set by the amount of RAM installed — a maximum of about 30K in a Model 100.

The third technique for transmitting information to and from the 100 or 200 is the simple yet powerful combination of OPEN, INPUT# and PRINT#. If you open a device of, say, "COM:88E1E" for input or for output or both, you can transmit and receive information. The data to be transferred may be taken directly from a file (on tape or from RAM)

or may be the result of calculation and rearrangement of data. Listing 1 shows a simple program which may be used to load information from tape to the Model 100 RS-232 port.

The input file could be CAS:, in which case line 100 will result in the cassette recorder scanning up to the beginning of the first tape file. The output file could be COM:88E1E (or in the Tandy 200, COM:88E1ENN). The entirety of the tape file will then be sent out to whatever is at the other end of the RS-232 cable.

There is no obvious limit on the number of characters to send or receive through BASIC. The BASIC program may be transmitting the results of calculations, or otherwise collecting and sending far more than 30K bytes. Or the received information may be processed within the program or sent to a printer, rather than simply being stored in RAM.

Of the three transmission methods in the 100 and 200, only one (uploading through Telcom) pays attention to CTRL-S's sent by the distant computer. When a CTRL-S is received from the distant computer (and if an upload is not in progress) the word "Wait" will appear in the label line. Of the three reception methods in the 100 and 200, only one ("Load from" through TEXT) can truly keep up with high baud rates. When that method is used no attempt is made to display the incoming data until after file transfer is complete.

The 600, on the other hand, does not have such a variety of ways available for RS-232 data transmission. The most obvious starting point is TELCOM, since one would expect to find uploading and downloading capability. But the TELCOM program in the Tandy 600 is quite different from that of its predecessors. As it turns out, Tandy 600 TELCOM can indeed upload files, though the word "upload" is never used. One of the TELCOM submenus, selected by the keyword Transfer, has a choice labelled Send. You can then choose to use XMODEM protocol, XON/XOFF protocol (if selected at the Modify submenu), or no protocol. The file to send may be a RAM file or a disk file. Neither may be larger than 64K. (If a CTRL-S is received from the distant computer the message "XOFF" will appear at the base of the screen.)

Tandy 600 TELCOM can also download files, either in the form of a running log of the telecommunications session (the so-called Capture process) or as a discrete file through use of the Transfer submenu and the choice labeled Re-

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ceive. The receive process may be performed using the XMODEM protocol, if desired. The destination of the download may be a RAM file or a disk file. Neither may be larger than 64K. The process has a timeout feature that makes it suitable only for continuous transmissions.

Is there a means of using the RS-232 port from within WORD (the Tandy 600 file editor analogous to TEXT in the 100 and 200)? Nothing in the manual indicates that it can be done, though intuition suggests there should be a way to specify a COM: device in the "Merge from" and "Print to" commands.

The 600 does not come with BASIC (it's available as an option ROM) so nothing like the OPEN, INPUT#, and PRINT# of the 100 and 200 can be done.

The 600 does have a COPY command, with provision for a variety of responses to the "copy from" and "copy to" prompts, including RAM, disk, printer (PRN:) and keyboard (CON:). The manual is silent, however, on whether COM: is a permissible device for either the input file or the output file.

Thus the only documented means of getting to and from the 600's RS-232 port is TELCOM. When information is to be transmitted to another computer, TELCOM works fine. But there seems to be no way to avoid having received information echoed on the LCD screen. Thus you can never really receive data at faster than the screen speed (near 300 baud). Granted, the baud rate can be set at 19200. And if XON/XOFF is used, the file may be downloaded without problems. But the screen's slowness will cause countless CTRL-S's to be issued, so that the effective data rate (taking into account the fraction of the time the distant device is idle waiting for a CTRL-Q to come in) will be no faster than the LCD speed.

THE PITFALL

The explanation to this point allows me to describe my first abortive effort to send data from the Model 100 to the 600. I studied both computers' manuals at length, then set both machines to 9600 baud, even parity and XON/XOFF enabled. In the Tandy 600 I did this with the Modify submenu of TELCOM; in the 100 I specified 88E1E after pushing F3 in TEXT.

When the 600 was ready to receive a file, I pushed Enter on the 100. The first dozen characters showed up on the screen of the 600, then a few lines of tildes appeared. The 100 was overrunning the 600.

This was puzzling. Since the first few characters came through, there was

Listing 1: Model 100/200 general purpose file transfer program.

```
100 INPUT "INPUT FILE";I$
:OPEN I$ FOR INPUT AS 1
200 INPUT "OUTPUT FILE";I$
:OPEN I$ FOR OUTPUT AS 2
300 IF EOF(1) THEN CLOSE
:END
400 I$=INPUT$(1,1)
500 PRINT #2,I$;
600 GOTO 300
```

Listing 2: Model 1 uploading instructions.

```
100 OUT 232,0
:initialize the UART
110 OUT 234,231
: set 8 data bits, 1 stop bit, even parity
120 OUT 233,238
: set baud rate of 9600
...
500 IF (INP(234) AND 64)=0 THEN 500...
: be sure UART is done with previous character
510 OUT 235,A
: send value of A to distant computer.
```

no doubt that the baud rate, word length, parity and stop bits were right. Nonetheless, the 600 was failing to keep up. I tried slower and slower baud rates. Even at 110 baud, characters were sometimes getting lost. The problem arose regardless of whether the selected destination file was RAM or disk.

After several minutes of study, I was able to narrow down the problem. Either the 600 was failing to send a CTRL-S at the right time (namely when its input buffer was near full) or the Model 100 was failing to pause upon receipt of a CTRL-S. Further study revealed the latter to be the cause.

This tells us something rather startling about the Model 100 — that selecting "E" in the expression COM:M7I1E does not assure that XON/XOFF will be enabled. In particular a choice of COM: M7I1E in BASIC or TEXT will not get you XON/XOFF behavior. Instead the 100 will go right ahead sending more characters no matter how many CTRL-S's are sent by the distant computer. An E only gets you XON/XOFF if it appears in the TELCOM Stat string.

I then tried sending to the 600 using

TELCOM and its F2 and F3 (download and upload) keys. With XON/XOFF selected in both computers, I had no difficulty sending information both ways, at all baud rates. But as I say, even if the baud rate is 19200 baud the time to transmit the file will be little faster, if at all, than the time to transfer at 300 baud. This is because screen speed limits transmission speed.

Here is the detailed procedure.

1. On the 600, enter TELCOM. Push SHIFT-ESC, if necessary, to reach the main TELCOM menu. Push M for modify and using the TAB key to move among the fields, set (for example):

Baud rate: 9600
Stop bits: 1
Data bits: 8
Parity: even
XON/XOFF: enabled
Duplex: full
Terminal mode: no
Add to EOL: none
Strip chars: no
Filter chars: no

Push Enter when the parameters are correct. Then push C for the "Connect"

SHAKING HANDS

submenu. Push TAB twice, to allow a "no" response to the query "Use modem?" (This query is rather a subtle point, not made clear in the Tandy 600 manual.) Push Enter to energize the RS-232 port. Then push SHIFT-ESC to get back to the TELCOM main menu. (This does not disturb the RS-232 connection.) Push "T" for the Transfer submenu, then R for "receive". Type in a filename (disk or RAM), then push Enter.

At the Model 100 set a Stat of 88E1E (88E1ENN in the Tandy 200). Push F3, specify a filename and push Enter. The data from the Model 100 will appear across the screen of the 600 and will be stored in a file. It will take several minutes to transmit a large file. If the destination file is on disk, there will be occasional pauses while full buffers are sent to disk.

Loading from the 600 to the 100 is much easier. In TEXT or TELCOM or BASIC, use 88E1E (or 88E1ENN on the 200) to prepare for a download. In TEXT, for example, push F2, and to the query "Load from:" type 88E1E and push Enter. At the 600, set up and connect TELCOM as described above. Push "T" for the Transfer submenu, then T for "transmit." Type in a filename (disk or

RAM), then push Enter. The transfer will occur at an actual rate very close to the selected baud rate: a 20K file will take about 20 seconds. If the Tandy 600 source file is on disk, there will be occasional pauses while portions of the disk file are read into RAM for eventual RS-232 transmission.

THE MODEL 1 CONNECTION

After I learned the vulnerable spots in the 600, I tackled the problem of sending from the Model 1 to the Tandy 600. Knowing the 600 can't receive RS-232 data very fast (because there is no documented way to bypass the LCD) I decided there was no point in being elegant or speedy in sending characters at the Model 1 end. I used a pretty simple BASIC program to OPEN the name-and-address file (the one that would sooner or later be lost to me when the Model 1 died) and send the characters to the Model 1's RS-232 interface. The Model 1 expansion interface and RS-232 card are set up so that I/O ports are used to set up the UART and to actually send individual bytes. Thus, though Model 1 BASIC does not let you OPEN the RS-232 port as an output file, it is nonethe-

less possible to send RS-232 information by means of the INP and OUT keywords. The relevant portion of the Model 1 BASIC program appears in Listing 2.

This program doesn't follow the XON/XOFF protocol. But BASIC is so slow there's little danger of overrunning the 600's screen, nor even its download-to-disk routine.

Line 500 is provided to check the transmitter buffer register of the UART to see if it is empty, thus allowing another character to be sent. I found the line was not even needed, since the execution of the other lines of code always took longer than the transmission time for the previous character.

With the Model 1 RS-232 switch set to COMM, and the program (Listing 2) running on the Model 1, I was able to collect and download the name and address files to the 600. Because the Model 1 program was slow and sporadic (disk access sometimes required several attempts and I was doing lots of data massaging such as lower case conversion) the "Transfer" process of the 600, which times out if transmission stops for too long, was unsuitable. I used instead the Capture method to get all the data into a log file. To do this, I named a disk file for

Civilize the DISK/VIDEO INTERFACE MAKE SAVAGE THE MODEL 100

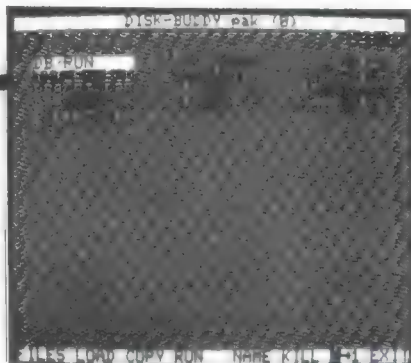
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SHAKING HANDS

the captured information using the Options submenu of TELCOM, connected to the RS-232 port and pushed function key F3 to activate the capture.

Normally, if information loaded to a computer needs to be massaged before being processed by a program, I just write a small BASIC program to do it. Because there's no BASIC in the 600, I knew I would have to massage the names and addresses in such a way that, when received in the 600, they could be readily assimilated "as is" by the database manager there. The 600 database manager expects carriage returns between records, and tabs between fields within records. So the Model 1 program inserted the required tabs and carriage returns.

THE DATA MANAGER

Once TELCOM had received the name and address information into a file, I had to get the information from that file to a database. Though the manual is sketchy here, the next step turns out to be to enter WORD, the word processor, set up an empty WORD text file, and use the Merge command to load into the text file from the file that TELCOM

had created. Once all the information is in the WORD text file, the next step is to use the Copy or Delete command of Word to get the information into the Scratch file. (The 600's Scratch file is like the Paste buffer in the 100 and 200.) Then exit WORD and go into FILE, the database manager.

When you're in a file, the documentation would lead you to think you can only add one record at a time to the size of the database. If the Scratch buffer contains 500 records, one gets the impression it will be necessary to create 500 empty records in the data file, then Insert the contents of the Scratch file into the empty records. I did not relish the idea of having to create 500 empty records manually.

Though no mention of it is made in the manual, it turns out that a peculiar positioning of the cursor prior to the Insert forces FILE to keep creating records as necessary to accommodate all the records in the Scratch file. Basically you move the cursor to the bottom row of the data base, which is labeled NEW. Then (and this is the undocumented part) move the cursor to the left until the entire row is in reverse video, and push I for Insert. My thousand-record file took ten min-

utes to get from the Scratch file to the data file. I didn't mind waiting the ten minutes, since I had to endure it only once and it was much easier than retyping the whole thing.

So I managed to save all my names and addresses. I quickly made backup 3-1/2 inch disk copies of the file, and stored them in separate, safe locations.

TANDY SUPPORT

Tandy has a special phone number especially for communications problems — 817/338-2394. They've only had the 600 there since the end of October, so they may not have all the answers just yet. But if you have problems interfacing the 600 to some machine other than those mentioned here, they may be able to help.

There's much to be learned about undocumented features of the Tandy 600. If you follow the methods described here, you'll be able to transfer information to and from the Tandy 600 with relative ease using the RS-232 port. □

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Turtle Power for Your Portable

A Mini-LOGO program can draw pictures and explain programming concepts.

By Ben Firschein

The Logo language has become popular for teaching programming and mathematical concepts to students as young as fourth graders. The language lets the student guide a cursor known as a "turtle" on the screen of a computer to produce designs. With only a few com-

mands, one can produce pictures of sea shells, flowers, trees and other geometric figures. Logo can also help teach advanced programming concepts such as recursion.

The following program lets you use a Logo-like turtle language on your Model

100. It takes advantage of the 100's high resolution graphics. The language has 15 primitives (built in commands) and allows you to define your own.

(Text continues on page 60)

```

10 REM TURTLE LANGUAGE FOR THE TRS-80
12 REM MODEL 100 COMPUTER
14 REM BEN FIRSCHEIN NOVEMBER 1983
16 REM
18 REM
20 ON ERROR GOTO 800
:REM handle error
30 REM
100 REM ***** CONSTANTS *****
105 REM
150 M=150
:REM maximum number of lines in the user's file
160 MS=50
:REM maximum stack contents
170 MF=20
:REM maximum number of user-defined functions
180 MP=20
:REM maximum number of allowed primitives
190 RC=3.1415927/180
:REM RADIAN CONVERSION CONSTANT
192 HM=239/2
:REM maximum horizontal distance from center to
:REM edge of screen
194 VM=63/2
:REM maximum vertical distance from center to
:REM edge of screen
196 REM
200 REM ***** ARRAY DECLARATION *****
205 REM
220 DIM PR$(MP)

```

```

:REM stores primitives
230 DIM S(MS)
:REM line # stack
240 DIM R(MS)
:REM counter stack
250 DIM FN$(MF)
:REM function names
260 DIM FL(MF)
:REM function locations
270 DIM CM$(M)
:REM stores tokenized commands
275 DIM NO$(M)
:REM stores argument to command if any
277 REM
278 REM ***** INITIALIZATION *****
279 REM
280 GOSUB 5100
:REM load primitives
290 REM
300 REM ***** MAIN PROGRAM *****
302 REM
350 CLS
:PRINT "TURTLE LANGUAGE";FRE(0);
"BYTES FREE"
355 PRINT
360 PRINT "[l]oad a file"
365 PRINT "[e]xecute a function [q]uit"
370 PRINT "[n]ames of functions [h]elp"

```

(Listing continues on page 67)

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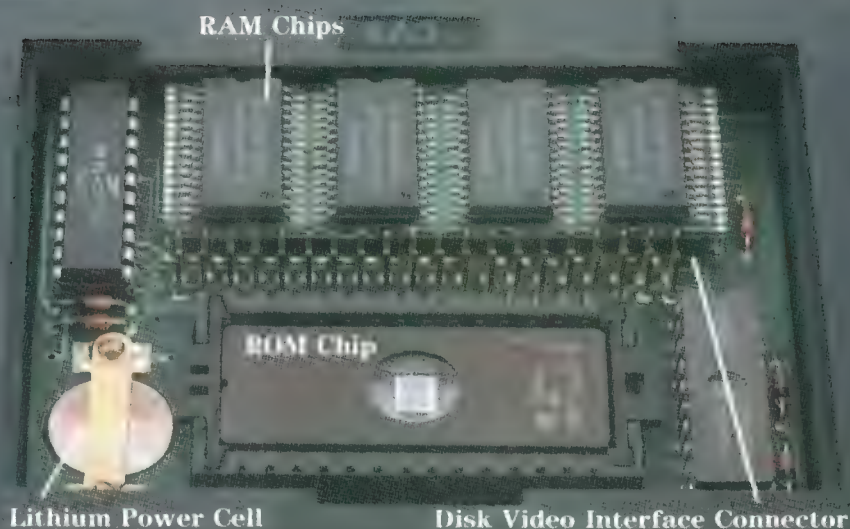
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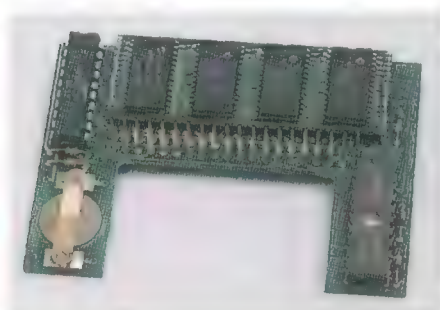


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A Book That Talks Back

Welcome to the world of interactive publications. My name is DYNA, and I'm here to help you.

By Mark Schorr and Rodney Owen



For 15 years, systems designers like Alan Kay have been predicting the arrival of truly interactive publications that respond intelligently to readers and viewers. While fancier concepts like Kay's dynabook may be a few years away, machines like the Model 100 can begin to be used to bring you "interactive publications" right now.

Presented here are some suggestions for building a program that brings you this new breed of publication (another synonym is *networked book*). For the interactive part, you need at least two Model 100's and one additional piece of hardware: a ring-detect cable. As this

article goes to press, there are many parts of the project left to do. By publishing a listing, the authors hope to challenge other Model 100 readers to send additional code fragments, and continue to build new versions of the publications controller.

WHAT ARE INTERACTIVE PUBLICATIONS?

Find an intelligent way to control the different media that now surround us, and you have an interactive publication program. Hacker software such as bulletin boards, game programs and home-brewed video text have provided

some of the key ingredients. Others come from consumer electronics: phone answering machines, home video and compact disk players.

What is meant by interactive, in this case, is best exemplified by computer games. The player doesn't simply sit back and watch, but interacts to change the outcome of the game. In fact, there is no game without the player. Apply this two-way interactive model concept to any conventional paper publication, say a Christmas catalog or novel and you've got an interactive publication.

What distinguishes interactive publi-
(continued on page 54)



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The Meter Is Running

Keeping track of how you spend your workday can mean the difference between profit and loss. This is especially important if you have many clients or do several different tasks. The portability of your Model 100 makes it ideal for keeping track of details. And here's a program to do the job.

By John M. Hicks

Charging by the hour. It's a business practice that's been around since man first figured out how to keep track of time. Consequently, each minute of each working day means money to someone. Keeping a close eye on how much time is spent on each project insures a day's pay for a day's work.

But that's the hard part. Many of us have several projects going on at the same time — each with its own hourly rate. It's virtually impossible, and certainly not practical, to complete one job before starting another. So each work day is chopped into segments. You start on one project, go to another, return to the original and then jump to a third. Keeping track of time spent on each task is a monstrous chore for you alone — but not for your portable computer.

I was pushed into making a change by a shift in my work. What had been a narrowly focused workstyle changed to one of relative diversity. As a result, I found myself always coming up short when it came time to send out bills. I just never had the basic time information and task details to satisfy reporting requirements.

WHERE THERE'S A WILL, THERE'S A WAY

I tried a manual system for a while — a notebook and pencil. Throughout the workday I entered a brief description along with start and stop times for each

of — typically — a dozen tasks. These ranged from brief client inquiries to extended report writing.

Since I'm frequently interrupted, I was forever recording multiple start and stop times and having to add up total time later. My notebook entries became more sloppy as the day wore on, and time recording became spotty.

Timekeeping for these long tasks was clearly inaccurate with this approach. Information loss was also a problem when facts relevant to brief interruptions were not recorded. The elapsed time was not important in these cases, but a name, phone number, part number, etc. were often sorely missed later, and then recovered only with extra effort.

FITTING THE BILL

After a few weeks of this inefficient system I enlisted my portable as a full time partner in automating these daily chores. Functional specifications for the solution were easily spelled out:

1. It had to require minimum attention from me to keep track of total times spent on the various tasks, especially during periods of frequent interruptions.

2. It had to automatically tally time increments into predetermined categories (client service, meetings, projects, etc.), so that I didn't have to process numerous bits of information for the weekly timesheet.

3. It had to generate a file of dates, total times and task descriptions that could be used for weekly reviews and monthly report generation.

The Model 100 is ideally suited for data-gathering and clock-watching chores. Its small size makes it easily portable and unobtrusive. The built-in BASIC interpreter is fast enough for essentially instantaneous response of a custom program during task editing and selection. The battery-backed memory provides hassle-free storage for accumulating results from day to day. The continuous clock provides more than enough accuracy for timekeeping. Finally, the built-in modem allows for uploading a week's data to a central computer for long term planning and report generation.

The system has reduced my weekly time reporting to a few minutes' effort (from an hour), and monthly progress reporting to an hour (from half a day). Additionally, the accuracy of time reporting has improved considerably. This resulted in a new degree of freedom to concentrate on the task at hand, while being confident that the accounting requirements are more than satisfied.

The growing task log on the host computer offers yet untapped opportunities for time management studies. Meanwhile, just the readability of these computer-printed records has been valuable in recovering items of fact that would have otherwise been lost in a notebook of sloppy or unreadable handwriting.

OPERATING TIMELOG

Since the program was designed for ease of use, the operator routinely performs only three steps:

1. Turn on the portable when starting, and select the TIMELOG program.
2. From time to time, as each new task starts, select from the TIMELOG menu the job to be monitored, or initiate a new one.
3. When done, press QUIT, which exits to the portable menu, and switch the computer off.

However, there are some one-time startup and occasional ongoing steps that need full descriptions to gain the benefits of TIMELOG. The screens in Figure 1 show all possible modes and features of TIMELOG operation.

Cursor selection of TIMLOG.BA at the main menu starts the program. It recovers any previous day's data from a file called TIME.DO (if present) as input to the program and the TIMELOG menu. This new menu displays truncated descriptions of the six most active tasks and their selection letters (left column). These descriptions are entered



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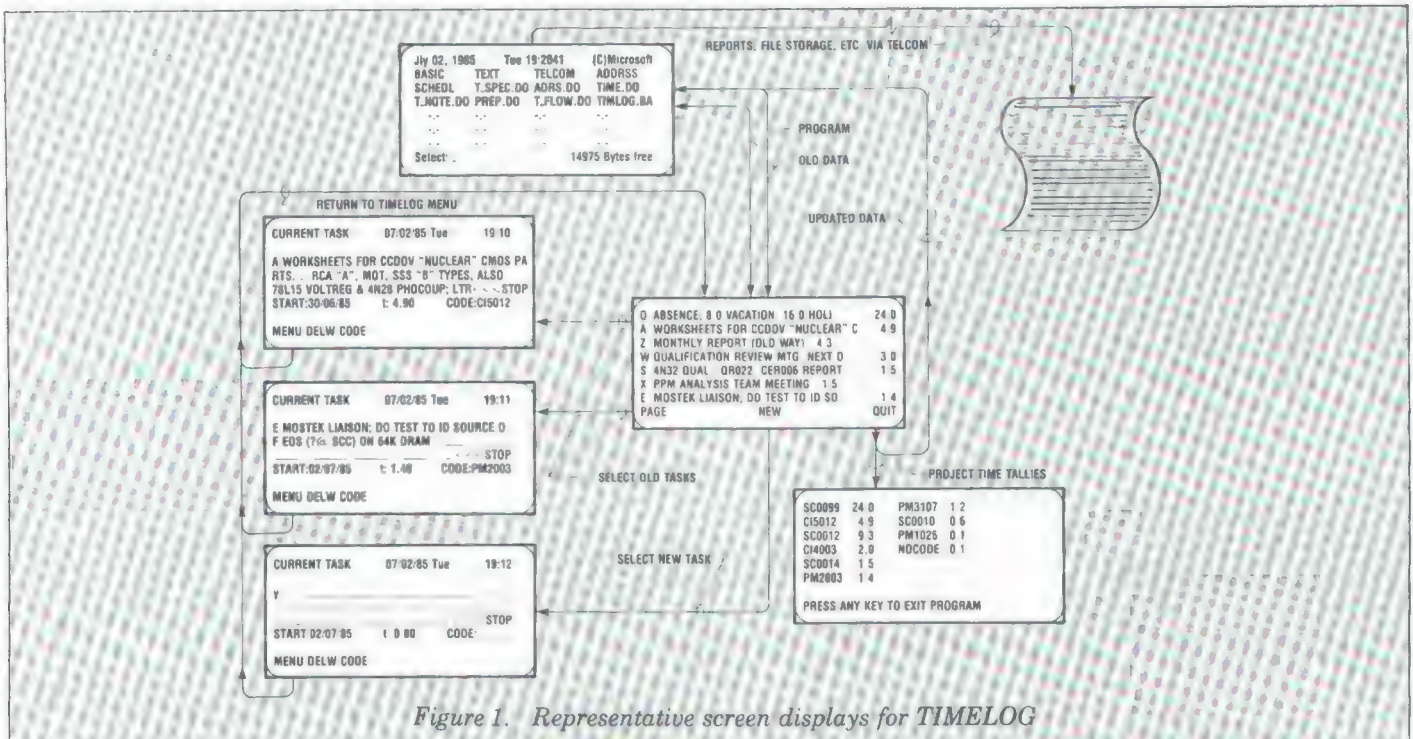
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by the user. Accumulated time for each task (in hours) is also given.

For menus containing more than six tasks, another page of the next six most active tasks may be viewed by pressing the PAGE function key. Subsequent pressing of PAGE will flip through all of the previously-defined tasks (up to 26 in all).

In the event that no previous TIME. DO data exists (as at the start of a week), or if the desired task has not been entered, the NEW function key will initiate a fresh task screen, ready for a description entry.

TASK ENTRY, EDITS AND UPDATES

After bringing up the task screen (with a single letter key or the NEW function key), all the available data fields for the current task will be in view, and timekeeping will have started for the selected task.

The first line shows the current date and time of day.

The third line repeats first the task selection letter and then shows the selected task description, which the user may complete just by typing up to the STOP marker on the fifth line.

The sixth line shows the starting date for the current task, its accumulated time, and the project code.

The operator may update the description and CODE fields at his leisure, whenever and for as long as the task is

```

1000 MAXFILES=1
      :GOTO 1710
      : ' PROG27 22/9/85 TIMELOG PROGRAM J. HICKS
1010 '
1020 CP%=CSRLIN*40+POS(0)
      :PRINT @35,LEFT$(TIME$,5);
      :PRINT @217,"t:";
1030 PRINT USING "##.##";TT#(M%);
      :RETURN
1040 '
1050 DC%=-DV%
      :CT%=TIME$
1060 ST#=VAL(LEFT$(ST$,2))+VAL(MID$(ST$,4,2))/60+
      VAL(RIGHT$(ST$,2))/3600
1070 CT#=VAL(LEFT$(CT$,2))+VAL(MID$(CT$,4,2))/60+
      VAL(RIGHT$(CT$,2))/3600
1080 TT#(M%)=CT#-ST#+TT#(M%)
      :RETURN
1090 '
1100 FG%=1
      :BEEP
      :RETURN
1110 FG%=2
      :BEEP
      :RETURN
1120 FG%=3
      :BEEP
      :RETURN
1130 '
1140 SCREEN 0,0
      :FOR Z=1 TO 8
      :KEY Z,""
      :KEY(Z) OFF
      :NEXT Z
      :RETURN
1150 '
1160 FOR Y=1 TO TQ%
      :TT#(Y)=ABS(TT#(Y))
      :NEXT Y

```


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METER

```
:RETURN
1170 '
1180 CLS
      :FOR Z=1 TO 38
      :FOR Y=1 TO 5
      :PRINT @40*Y+Z,"H";
      :NEXT Y,Z
1190 FOR Z=LB% TO RB%
      :FOR Y=2 TO 4
      :PRINT @40*Y+Z," ";
      :NEXT Y,Z
      :RETURN
1200 '
1210 CLS
      :PG%=PG%+1
      :IF PG%>INT((TQ%-1)/7) THEN PG%=0

1220 GOSUB 1330
1230 FG%=0
1240 ON FG% GOTO 1210,1540,1860
      :S1$=INKEY$
      :IF S1$="" THEN 1240
1250 M%=INSTR(FSS,S1$)
      :M%=M% MOD 27
1260 IF M%>0 AND M%<=TQ% THEN 1580 ELSE BEEP
      :GOTO 1240
1270 '
1280 FG%=0
1290 IF DC%=DV% THEN GOSUB 1480 ELSE ON FG%
      GOTO 1380,1660,1420
1300 S1$=INKEY$
      :IF S1$="" THEN DC%=DC%+1
      :GOTO 1290
1310 DC%=-DV%
      :TDS(M%)=TDS(M%)+S1$
      :PRINT S1$;
      :GOTO 1290
1320 '
1330 Z=0
1340 FOR AZ=(7*PG%+1) TO (7*PG%+7)
      :IF AZ>TQ% THEN RETURN ELSE Y=PLZ(AZ)
1350 PRINT TL$(Y)+LEFT$(TDS(Y),33)+" ";
      :PRINT USING "##.##";TT$(Y);
1360 Z=Z+1
      :IF Z=7 THEN RETURN ELSE PRINT ""
      :NEXT AZ
1370 '
1380 FOR Z=LEN(TDS(M%))-1 TO 1 STEP -1
      :IF Z<=1 THEN TDS(M%)=""
      :GOTO 1630
1390 IF MID$(TDS(M%),Z,1)="" THEN
      TDS(M%)=LEFT$(TDS(M%),Z-1)+" "
      :GOTO 1630
1400 NEXT Z
1410 '
1420 GOSUB 1020
      :A$=""
      :PRINT @233,"";
1430 Z=LEN(A$)
      :IF Z=7 THEN 1450
1440 S1$=INKEY$
      :IF S1$="" THEN 1440 ELSE A$=A$+S1$
      :PRINT S1$;
      :GOTO 1430
1450 BEEP
      :PRINT @CPZ,"";
      :TCS(M%)=A$
1460 Z=INSTR(FSS,TL$(M%))
      :IF Z<27 THEN 1280 ELSE Z=Z-27
```



```

      :TL$(M%)=MID$(FSS,Z,1)
      :GOTO 1280
1470 '
1480 GOSUB 1050
      :ST$=TIMES
      :GOSUB 1020
      :PRINT @CP%,"";
      :IF TQ%=1 THEN RETURN
1490 SCREEN 0,0
      :GOSUB 1020
      :PRINT @280,"SORTING TASKS";
      :PRINT @CP%,"";
1500 FOR A%=1 TO TQ%
      :TG#=0
      :FOR Z=1 TO TQ%
1510 IF TT#(Z)<TG# THEN 1520 ELSE TG#=TT#(Z)
      :PL$(A%)=Z
      :I%=Z
1520 NEXT Z
      :TT#(I%)=-TT#(I%)
      :NEXT A%
      :GOSUB 1160
      :SCREEN 0,1
      :RETURN
1530 '
1540 IF TQ%=26 THEN PRINT @280,"FULL MENU";
      :BEEP
      :GOTO 1230
1550 TQ%=TQ%+1
      :M%=TQ%
      :TL$(M%)=MID$(FSS,M%+27,1)
1560 TY$(M%)=RIGHT$(DATE$,2)
      :TMS(M%)=LEFT$(DATE$,2)
      :TAS(M%)=MID$(DATE$,4,2)
1570 '
1580 GOSUB 1140
      :ON KEY GOSUB 1110,1100,1120
      :KEY 1,"MENU"
      :KEY(1) ON
      :KEY 2,"DELW"
      :KEY(2) ON
1590 KEY 3,"CODE"
      :KEY(3) ON
      :SCREEN 0,1
      :ST$=TIMES
      :CLS
      :GOSUB 1020
1600 PRINT @0,"CURRENT TASK ";DATE$;
      :PRINT " "+DAY$;
1610 PRINT @200,"START
      : "+TAS(M%)+"/"+TMS(M%)+"/"+TY$(M%)
1620 PRINT @228,"CODE
      : ";
      :PRINT @233,TOS(M%);
1630 PRINT @80,STRING$(113,"_");
      :PRINT @141,".";
      :PRINT @193,"<<<STOP";
1640 PRINT @80,TL$(M%)+TDS(M%);
      :GOTO 1280
1650 '
1660 GOSUB 1050
      :CLS
1670 GOSUB 1140
      :PG%=0
      :KEY 5,"NEW"
      :KEY(5) ON
      :KEY 8,"QUIT"
      :KEY(8) ON
1680 IF TQ%>7 THEN 1690 ELSE ON KEY

```

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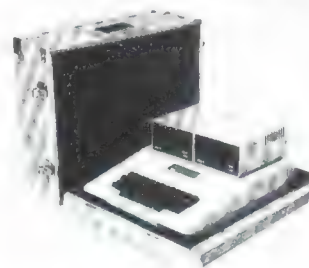
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selected, without disturbing the time-keeping. While sitting at a task screen, keyboard data entry defaults to the description field. The size of this field will yield a TIME.DO data file record that is 132 characters long — an appropriate size for single-line printout of all task data on most current printers. (To use 80 column printers, stop data entry at the period.) Any data entry errors may be corrected with the DELW (delete word) function key, which erases all characters back to the previous space in the description.

Press the CODE function key to enter a project's code. This temporarily switches keyboard data entry to this field until seven characters are entered. Entry then reverts back to the task description field. Errors in this process are corrected by re-pressing CODE and again entering all seven desired characters. Codes may be padded with spaces. A default code of NOCODE is automatically assigned to a task until the operator enters one.

About once every minute the program flashes a message in the lower left corner of the display when the task screen is displayed. This signals the TIME-LOG-produced periodic interrupt which

```
GOSUB ...,1110,,,1120
:SCREEN 0,1
:GOTO 1220
1690 ON KEY GOSUB 1100,,,1110,,,1120
:KEY L,"PAGE"
:KEY(1) ON
:SCREEN 0,1
:GOTO 1220
1700
1710 CLEAR 4000,MAXRAM
:TQ%=0
:DV%=1200
:DEFINT U-Z
:LB%=15
:RB%=24
:GOSUB 1180
1720 PRINT @136;"TIME LOG";
:ON ERROR GOTO 2130
1730 Z=26
:DIM TDS(Z),TDS(Z),TT#(Z),PL%(Z),TYS(Z),TMS(Z)
1740 DIM TAS(Z),TCS(Z),PT#(Z),PCS(Z),PSS(Z)
1750 FSS="QAZWSXEDCRFVTGBYHNUJMIKOLP"
+" qazwsxedcrfvtgbyhnujmikolp"
1760 FOR Z=1 TO 26
:TT#(Z)=0
:PL%(Z)=Z
:TDS(Z)=" "
:TCS(Z)=""
:NEXT Z
1770
1780 Z=0
:FG%=0
```

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```

:OPEN "RAM:TIME.DO" FOR INPUT AS 1
:PRINT @280,"LOADING DATA";
1790 IF EOF(1) THEN TQ%=Z
:CLOSE
:CLS
:GOTO 1670 ELSE LINE INPUT #1,AS
1800 IF FG%=1 THEN 1810 ELSE FG%=1
:GOTO 1790
1810 Z=Z+1
:TYS(Z)=LEFT$(AS,2)
:TM$(Z)=MID$(AS,3,2)
:TAS(Z)=MID$(AS,5,2)
1820 TT$(Z)=VAL(MID$(AS,16,4))+RND(1)*.001
:TD$(Z)=MID$(AS,20,112)
1830 TC$(Z)=MID$(AS,8,7)
:IF TC$(Z)="NOCODE" THEN
  TL$(Z)=MID$(FSS,Z+27,1)
1840 TL$(Z)=MID$(FSS,Z,1)
:GOTO 1790
1850 '
1860 GOSUB 1140
:LB%=14
:RB%=25
:GOSUB 1180
:PRINT @135,"TALLY TIME";
1870 FOR Z=1 TO TQ%
:IF TC$(Z)="" THEN TC$(Z)="NOCODE"
1880 NEXT Z
1890 PQ%=0
:IF TQ%=0 THEN 2110
1900 PQ%=PQ%+1
:PT#(PQ%)=0

```

reorders the internal job order according to activity so the most active tasks appear first in the next menu presentation. It also updates the screen data with the latest accumulated time and the latest time of day (24 hr. format). Both times are derived from the portable's internal clock.

Task description or project code data may be entered during these interrupts without loss of information.

The task description screen must be visible for task time to accumulate. Typically leave it untouched most of the time except to update the description or, of course, to go to a different task through the TIMELOG menu.

TIME TALLIES FOR PROJECT CODES

One of the major outputs of the program is the automatic tally of times for each project code. These are presented on the portable screen each time the operator terminates TIMELOG operation via the QUIT function key. The sequence is to gather the accumulated times from all tasks and add them up by project code. Next it displays the codes and their time tallies in a table, updates

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the TIME.DO data file and returns to the system menu when any key is pressed.

The QUIT option must be used whenever the portable is shut off (as at lunchtime or quitting time), or whenever the operator wants to transmit the TIME.DO data file, operate another BASIC program or use an application program. To suspend temporarily the task time accumulation, call up the TIME-LOG menu with the MENU function key.

Since all the data now exists in a standard document file (TIME.DO), it may be "groomed" using TEXT. For example, the time field can be edited for a long uninterrupted activity when one does not wish to leave the portable simply accumulating time, as during a vacation. Or, the operator may want to annotate the first (identification) line of the TIME.DO file before transmission to a host computer.

THE TIMELOG SOFTWARE

I've been using TIMELOG daily for more than three months. Thus the listing includes a number of refinements to make it more user-friendly and less susceptible to operator error.

```

:PSS(PQ%)=""
:FOR X=1 TO TQ%
1910 IF TT#(X)=>0 THEN PC$(PQ%)=LEFT$(TCS(X),6)
:GOTO 1930
1920 NEXT X
:GOSUB 1160
:GOTO 1960
1930 FOR Y=1 TO TQ%
:IF LEFT$(TCS(Y),6)<>PC$(PQ%) THEN 1950
1940 PT#(PQ%)=PT#(PQ%)+TT#(Y)
:TT#(Y)=-TT#(Y)
:PSS(PQ%)=PSS(PQ%)+TL$(Y)
1950 NEXT Y
:GOTO 1900
1960 CLS
:SP%=0
1970 X=1
:FOR U=0 TO 2
:FOR Y=0 TO 5
:V=SP%*18+X
:W=(Y*40)+(U*14)
1980 PRINT @W,PC$(V);
:PRINT @(W+7),"";
:PRINT USING "##.##";PT#(V);
1990 IF V=PQ%-1 OR V=18 OR V=26 THEN 2010
:ELSE X=X+1
:NEXT Y,U
2000 '
2010 PRINT @280,"TIME.DO UPDATE";
:FG%=1
:KILL "TIME.DO"
2020 OPEN "RAM:TIME.DO" FOR OUTPUT AS 1
2030 PRINT #1,RIGHT$(DATE$,2)+LEFT$(DATE$,2)+

```



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```

MIDS(DATES$,4,2);
2040 PRINT #1,STRINGS(105,"-")+ "TIME.DO "
+DATES$+" "+DAY$
2050 FOR A%=1 TO TQ%
:Y=PL%(A%)
:PRINT #1,TY$(Y)+TM$(Y)+TA$(Y)+" ";
2060 PRINT #1,LEFT$(TCS(Y)+SPACES(7),7)+" ";
2070 PRINT #1,USING "##.##";TT$(Y);
:PRINT #1,LEFT$(TDS(Y),112)
:NEXT A%
:CLOSE
2080 PRINT @280,"PRESS ANY KEY TO EXIT PROGRAM";
:BEEP
2090 AS=INKEY$
:IF AS="" THEN 2090 ELSE 2110
2100 '
2110 SCREEN 0,0
:CALL 23164,0,23366
:CALL 27795
:CLEAR 0,MAXRAM
:MENU
2120 '
2130 IF ERR=52 AND FG%=1 THEN PRINT
@288,"ORIGINATE";
:RESUME NEXT
2140 IF ERR=52 AND FG%=0 THEN 2160
2150 PRINT ERL
:STOP
2160 CLS
:PRINT
:PRINT @50,"NO PREVIOUS TASK DATA;"
2170 PRINT @88,"PRESS 'NEW' FOR FIRST TASK"
:RESUME 1670

```

When reduced to essentials, the TIMELOG system is basically a portable device for gathering randomly occurring data and performing simple real time arithmetic on it for later analysis.

It's not hard to imagine other uses for the same or modified versions of TIMELOG:

Medical personnel could enter treatment details for patients, with the data keyed to the name or other patient identification. Billing data would reflect the actual time spent, and the patient history would be in computer compatible format.

Field servicemen could report time spent, repair parts used, equipment model numbers, etc., all of which would help in client billing, spares stocking and identification of any product failure trends when the data files are uploaded to and analyzed by a host computer.

There are certainly other applications as well. Don't be surprised if the next time you walk into your lawyer's office, he whips out his portable, smiles and says, "The meter's running." □

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cations from plain paper books is the kind of software that "brings you" the publication. All publications — whether electronic or not — have some sort of software. The software of a paper book logically connects the elements of the book to the reader's imagination, and may relate to other books. However, there are no physical connections involved.

The software of the networked Model 100 host computer connects its physical hardware to that of other computers. In

this case, the various "copies" of the publication are physically, as well as logically linked — hence the title "the networked book."

DESIGNING DYNA

Downloading network programs from the Model 100 users' group on CompuServe gave us the idea for a new publications mechanism. It was possible, we realized, to combine two ideas that had been around for some time: network bulletin board software and telephone an-

swering machines.

With Model 100 SIG software MINET version 1.03 (written and shared as "freeware" by its copyright owner David J. Ulmer), a modified dialer program from *Portable 100/200* (April 1985), a 24K Model 100 and a telephone ring-detect cable, we could control the Model 100 as a "publications controller" over a link — in this case a telephone line.

Although neither MINET or the auto answer software from Bricom, the manufacturer of the cable, was exactly to our liking, they provided a solid basis from which to start. Our primary objective was to find a better way to exchange messages other than through MCI or EasyLink or EasyPlex. Also, we wanted to run the controller in a stand-alone, automatic mode, from which it would dial us back from its location so the long-distance costs could be controlled and logged from a single location.

We wanted the Model 100 to answer the phone in a set number of rings, find the caller's name and password (in addition to his phone number) in ADRS.DO, log a redial request and wait for the user to enter a different phone number. Then the program would "hang up" the phone and close the modem port, wait a minute, then "pick up" the phone and dial the new number. Additionally, if no carrier signal was found, the system would redial a set number of times or until a connection was made.

MINET answers the phone, checks names and passwords in ADRS.DO, displays a menu which is easily expandable, and will up- or download files. We modified the dialer program to use communication parameters (like M7E1E) taken from ADRS.DO to dial a phone number. We also modified TELKY (available on CompuServe's Model 100 SIG) that, when TELCOM is running, sets the special function keys F6 and F7 to display the free RAM and list the directory (see Listing 2).

"Messaging" was one reason for wanting to build DYNA. As well as being a *file server* and a way to receive electronic mail from friends, we wanted DYNA to actually print out the letters we received. With this design, anyone's portable computer could become a home answering machine. Users who have several printers at home could receive paper messages from other users on the printer of choice practically as soon as it came over the line.

Our file/prINTER server thus becomes the "back cover" of our book. If you can have hard copy to read, to carry around and to act on, you have more than simple electronic mail. You have an electronic

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notebook. The reality was finally catching up with the hype, at least so it seemed.

We've dialed DYNA from several different computers. For example, one of our first calls was via a Wang PC. Later we called the Model 100 with much larger machines. There was something wonderful and at the same time ironic about having the Model 100 host a minicomputer with over 4 gigabytes of storage.

The main problem we had once things worked all right was to remember to set the remote system's modem parameters to ANSWER and the Model 100's host switch to ORIG. (Otherwise, the host 100 can't auto-dial the user and make a connection.)

LOGGING ON

DYNA displays a welcoming message and then gets down to business. First you're asked for your name and password. (Make sure the network administrator at the host 100 enters a line with your name, password and phone number in its ADRS.DO file.) If you mistype either, DYNA will have to read the entire ADRS file and then ask your name and password again.

When you dial DYNA and make the connection, you're greeted with the logon sequence and then a menu, which can easily be changed by the host. Figure 1 is an example of a sample menu.

- | | |
|---------------------------------------|----------------|
| 1. Sign Off | 3. Delete File |
| 2. Leave File | 4. Get Help |
| R = Redial | |
| 5. Mark's message on Tue 02/06/85 | |
| 6. Rod's answer on Tue 02/06/85 | |
| 7. Recent memo series on Wed 02/07/85 | |

Figure 1: After logging into DYNA, an option menu is displayed. Menus can be easily modified by the operator.

The Help file can be tailored for the particular dynamic notebook you're setting up. Keep it fairly small (less than 2K), explain everything, and provide the communication details. We revised ours so it would match the menu. Use your imagination.

For us, any user should be able to delete files — generally it'll be one the user has put up in error.

GETTING IT JUST RIGHT

The version of DYNA that we designed needed some debugging, and if 100 users add routines to it, it will need more. To debug an interactive publications controller, it helps very much to have two people, and a local phone con-

nection, because often the bug hides in the interactive part of the software that you can see from one end but not the other.

Debugging any piece of software involves a series of tests, theories, comparing what works to what doesn't. It also involves much careful thinking. Debugging is mentioned not to discourage you, but to suggest that DYNA software is real software that has to be tried in the real world and modified in an evolutionary approach until you're satisfied with

what it does.

We used version numbers to control identification of the entire program level. For smaller changes, we tried to key in the date and version number as remarks.

Some programs work most of the time, and most programs work some of the time, but you can't get all programs to work all of the time. Sometimes, you have to cut back on the goals or functionality you're trying to add to a piece of software. For example, our original spec

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The price of \$89.95 includes a drive system with cable attached, one Micro Wafer, operating instructions and one-year membership to the A&J Bulletin Board.

Manufacturer's Specifications

System 100
A&J Micro Drive
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Price: \$89.95

Baud Rate: 14,000 bits/second
Tape Speed: 10 inches/second
Capacity: 1.5K bytes/foot tape
10' = 15K bytes
62' = 100 K bytes

Lengths: 10, 20, 35, 50, & 62'
Power Supply: 4 "AA" cells
Connection: Uses RS-232 port
Cable: 30 inch RS-232 attached
Size: 6 x 4 x 2.5 inches
Weight: 24 ounces

called for the host 100 to sit in a computer machine room and dial us back when we called it. Unfortunately, only tone dialing would get through the switchboard where the 100 was installed — and only a Tandy 200 has tone dialing.

So we took the 100 home and hung it off the home phone line. Some really intriguing problems cropped up. When someone in the house answered the phone, the 100 would soon cut in with a carrier signal because the "ring counter" was simply a delay loop that started once the first ring was heard. The result? Have you ever tried carrying on a voice conversation with a carrier tone flailing away?

We attempted to solve this problem by instructing the 100 to acknowledge the first ring, wait "n" rings, then to listen for an ANSWER carrier signal. The result? It could hear an ORIGINATE carrier, but not an ANSWER. We ended up commenting out the code (which you can see) and specifying that it should only be used on a dedicated line.

When we got the first versions working and hid the machine in the laboratory (connected to wall and phone out-

Listing 1: The DYNA program for the Model 100.

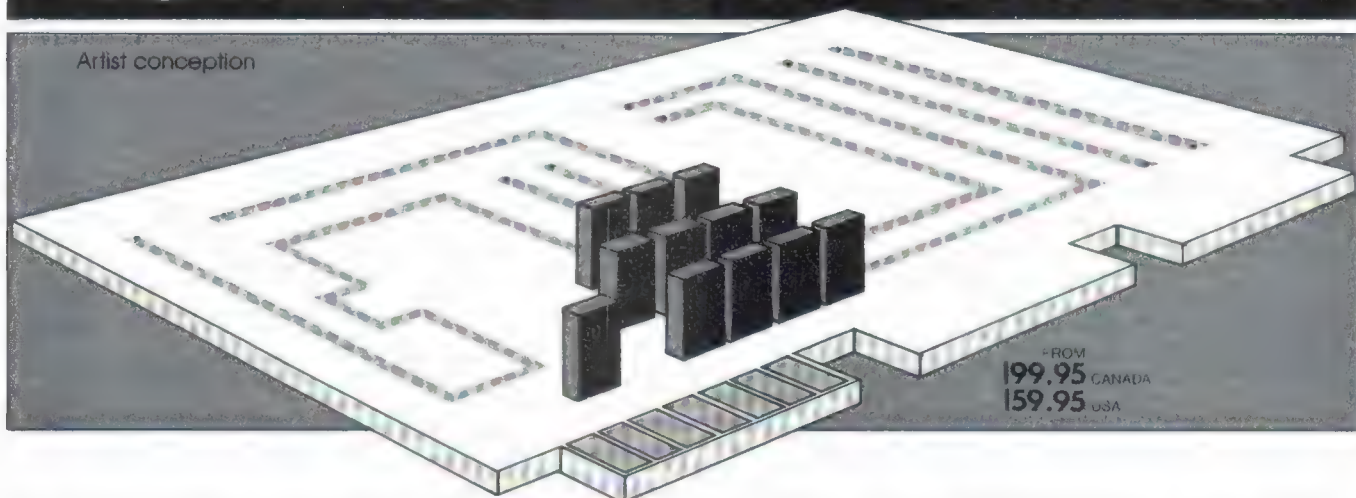
```

1000 CLS
:PRINT @200,"DYNA V. 3.18 from CIS/M100SIG
MINET"
1010 PRINT "Copyright (c)1983 David J. Ulmer; mods
1985 by Rod Owen"
1020 CLEAR 730,62800!
:MAXFILES=6
:CRS=CHR$(13)
1030 '
1040 OPEN "RAM:LOG.DO" FOR APPEND AS 6
1050 'PATCH 3/13 (to 1.06, producing 1.07) to
allow logging to choice of "LPT:", "LCD:", or
"RAM:LOG.DO" as specified in line 35
1060 'Additionally, use "R" or "r" at menu level to
request REDIAL.
1070 '
1080 CS$=CHR$(19)
:CQ$=CHR$(17)
:CC$=CHR$(3)
:BS$=CHR$(8)
:DS$=",DO"
1090 FOR J=62801! TO 62807!
:READ AA

```

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```

:POKE J,AA
:NEXT J 'allow carrier check on call back to
      user, to know when connected
1100 DATA 205,239,110,50,230,245,201
1110 'per DIAL#, Portable 100, 4/84
1120 ON MDM GOSUB 1340
1130 ON ERROR GOTO 1280
1140 DEFINT A-Z
1150 NRING = 0 'rings before answering
1160 ND = 5 'number of times to dial user back if
      no answer
1170 '
1180 'Mainline
1190 U=12
      : 'U=Max Menu entries+1
1200 GOSUB 1580 'connect system, open files
1210 PRINT #2,""
      :PRINT #2,"DYNA2 V1.08 (3/17)"
1220 PRINT "Answering a call..."
1230 PRINT #2,""
      :PRINT #2,"Welcome to Dynabook 302,006,171. "
1240 GOSUB 1770
1250 GOSUB 1950
1260 GOTO 1190
1270 '

```

lets), we used it but had trouble figuring out what was going on.

LOG, LOG, LOG

The big surprise was how dull the system was from a host sysop's point of view — nothing much indicated any activity and the only way we could really check on things was to call DYNA from another machine (unless we were willing to BREAK the program and see which new files had been uploaded). Consequently, we added logging — more and more of it — until we were logging the supplied names and passwords, the date and time when the menu was displayed and the menu option the user was selecting (uploading, downloading, reading the help file, etc.). Naturally we wanted to be able to redirect the log fairly easily to RAM, LCD, LPT or CAS files. (Most of the time, we run with the LCD doing the logging since it's important for the operator to be able to monitor the progress of a session.)

FUTURE ENHANCEMENTS: AN OPEN CHALLENGE

As this article goes to press, there are many opportunities to enhance or add to

(Text continues on page 66)

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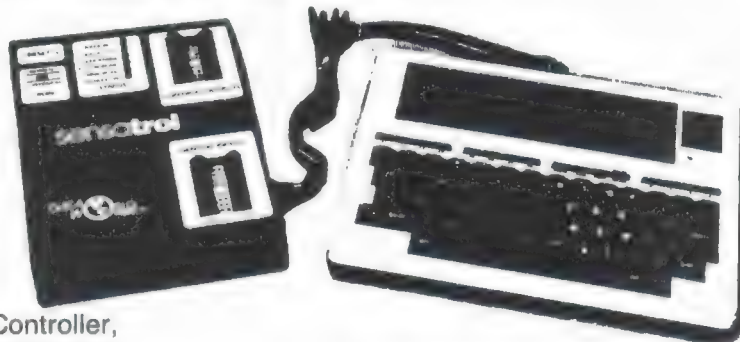
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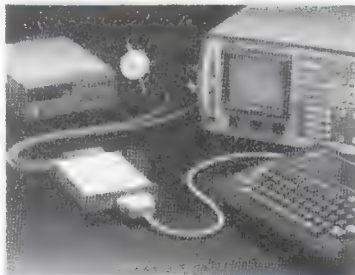
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DYNA

```

1280 'Error Trap Routine
1290 IF ERR=18 THEN CLOSE
      :RESUME 1560
1300 IF ERR=60 THEN RESUME 1480
1310 AS="System Error"+STR$(ERR)+" in "+STR$(ERL)
1320 PRINT #6,AS
      :PRINT AS
      :PRINT #2,AS
      :RESUME 1500
1330 '
1340 'MDM Interrupt service
1350 MDM OFF
      :IS=INPUT$(1,1)
      :IF IS<>CQ$ THEN 1370
1360 PRINT #2,""
      :PRINT #2,"Aborted..."
1370 RETURN
1380 '
1390 'Get User input
1400 AS=""
      :PRINT #2,CQ$;
1410 I=PEEK(65414!)
      :IF I=0 THEN T=T+1
      :IF T=9999 THEN ERROR 60 ELSE 1410
1420 IS=INPUT$(1,1)
      :PRINT #2,IS;
1430 IF IS=CQ$ THEN IS=""
      :T=-1
      :RETURN
1440 IF IS=CR$ THEN T=0
      :PRINT #2,""
      :RETURN
1450 IF IS=BS$ THEN I=LEN(AS)
      :IF I>0 THEN AS=LEFT$(AS,I-1)
      :GOTO 1410
1460 AS=AS+IS
      :GOTO 1410
1470 '
1480 'Timeout Logoff
1490 PRINT #2," "
      :PRINT #2,"Sorry, your time for typing has
      expired..."
1500 PRINT #2,""
      :PRINT #2,"Goodbye ";NS$; ", call back when you
      can..."
1510 PRINT "Timeout occurred"
1520 D=19
      :IF M<4 THEN 1560
1530 ON ERROR GOTO 1550
1540 D=D-1
      :IF D=M THEN 1560 ELSE FS="MU"+STR$(D)+D$
      :KILL FS
      :GOTO 1540

```


DYNA

```

1550 RESUME 1530
1560 RUN 1020
1570 '
1580 CALL 21179
      : 'Hang up phone and wait for call
1590 PRINT #6, "Waiting to be called at "; TIME$; CR$
1600 PRINT "Waiting to be called at "; TIME$; CR$;
1610 IF (INP(208)-224) > 0 THEN 1600
1620 FOR I = 1 TO NRING * 1000
      : NEXT I 'delay 3 seconds for each ring
1630 'Check for still ringing -- in case it's been
      answered in voice mode
1640 'FOR XT=1 TO 300 'for one second
1650 'IF (INP(208)-244)>0 THEN 600 'rings
1660 'NEXT XT
1670 'GOTO 500 'hang up our line -- someone else is
      on
1680 I=1
      : CALL 21200
      : 'Connect phone line
1690 FOR J=1 TO 2
      : FOR K=1 TO 1000
      : NEXT 'wait 3 secs.
1700 POKE 65344!, 1
      : CALL 28399
      : IF PEEK(65344!) <> 0 THEN I=I+1
      : IF I=999 THEN GOTO 1580 ELSE GOTO 1700 'wait
      for carrier
1710 NEXT J
1720 OPEN "MDM:8N1E" FOR INPUT AS 1
1730 OPEN "MDM:8N1E" FOR OUTPUT AS 2
1740 PRINT "Opening modem"
1750 RETURN
1760 '
1770 'Check Name and Password DYNA2 version 1.05,
3/11/85
1780 PRINT #2, ""
      : PRINT #2, "First Name?";
      : GOSUB 1390
1790 TRIES = 0
1800 SN$ = A$
      : PRINT "Checking out "; A$
1810 OPEN "ADRS" FOR INPUT AS 3
1820 LINE INPUT #3, N$ 'skip 1st or endline
1830 IF EOF(3) THEN PRINT #2, ""
      : PRINT #2, "No Match"
      : CLOSE 3
      : N$ = ""
      : GOTO 1780
1840 INPUT #3, N$
      : IF SN$ <> N$ THEN LINE INPUT #3, N$
      : GOTO 1830 'if not a match, read & forget next
      part of line

```

(Listing continues on page 62)

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SO SIMPLE**LOGO** (from page 36)**WRITING IN TURTLE LANGUAGE**

A turtle program consists of a "work space" that contains function definitions. To make a workspace, use the built-in text editor. Figure 1 shows a typical workspace.

Functions are defined with the *to* command followed by the name of what's being described. All commands should be lower-case with only one per line. After this declaration, the body of the function follows. Each function must be concluded by the command *end*. Failure to do so will cause an error.

Note that the function *flower* in Figure 1 has the command *circle* in it. This command was defined above in the workspace. Functions may call other functions, as long as they have been previously defined. Functions may even call themselves.

The indentation shown in Figure 1 is not required, but is used for clarity. If you do indent, use spaces rather than the Tab key. It will put tab characters in the workspace that will keep the program from recognizing commands.

Here's a list of the built-in turtle commands. If a command has a set of parentheses () after it, then a certain number of degrees or units must be entered when used in a definition.

turn () Turns the turtle () degrees to its right. Use negative numbers to turn the turtle to the left.

penup Makes the turtle move without drawing.

pendown Makes the turtle draw when it moves. This is what the turtle ordinarily does unless given a penup command.

heading Makes the turtle go at a heading of () degrees.

forward Makes the turtle go forward. See setunits and addunits commands below.

back Makes the turtle go back. See setunits and addunits below.

setunits () Changes the amount of units the turtle moves when given a forward or back command. The default setting is five. To give you an idea of units, the horizontal distance from the center of the screen (where the turtle starts) to the edge of the screen is 199 units. The vertical distance is 31 units.

addunits () Adds () to the number of units the turtle moves when you give it a forward or back commands. Use a negative number to decrease the number of units.

clear Clears the screen and positions the turtle back at the center of the screen.

center Positions turtle back at the center without clearing screen.

repeat () Repeats several commands the defined number of times.

endrepeat Ends the repeat command. Repeat loops may be nested several levels. Generally, it's not a good idea to go more than five levels as you may run into "stack overflow" problems. The circle and flower functions in Figure 1 have examples of repeat loops.

Figure 1: A typical workspace.

```
to circle
  repeat 10
    forward
    turn 36
  endrepeat
end
```

```
to flower
  setunits 10
  repeat 10
    circle
    turn 36
  endrepeat
end
```

```
to shell
  setunits 1
  repeat 100
    pendown
    forward
    addunits 1
    turn 10
    center
  endrepeat
end
```

AN ADVANCED COMMAND FOR RECURSION

Some programming languages such as this turtle language have a capability known as recursion. A recursive function calls itself. You might think a program that calls itself would never stop

(Text continues on page 74)

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```

1850 TRIES = TRIES + 1
1860 INPUT #3,PS
1870 IF TRIES>1 THEN GOTO 1890 ELSE PRINT
      #2,"Password?";
      :GOSUB 1390
1880 FOR I=1 TO LEN(AS)
      :IF ASC(MID$(AS,I,1))>96 THEN MID$(AS,I,1) =
        CHR$(ASC(MID$(AS,I,1))XOR 32)
      :NEXT I 'Raise to upper case
1890 SP$=AS
      :IF SP$<>PS THEN GOTO 1820 'check next name &
        password
1900 INPUT #3,PH$
1910 CLOSE 3
      :PRINT #2,""
      :PRINT #2,"Login ";NS$;" at ";TIMES$;" on";
        DAYS$;" ";DATES$
1920 PRINT "Logged ";NS$;" on at ";TIMES$
1930 PRINT #6, "Logged ";NS$;" on at ";TIMES$;" ";
        DATES$
1940 '
1950 'Main Menu
1960 IS=""
      :MDM ON
      :OPEN "MENU" FOR INPUT AS 3-
1970 PRINT #6,"MENU at ";TIMES$;" ";DATES$
1980 PRINT "Menu at ";TIMES$
1990 LINE INPUT #3,AS
      :IF IS<>CC$ THEN PRINT #2,AS
2000 IF EOP(3)=0 THEN 1990

```

```

2010 CLOSE 3
      :M=VAL(LEFT$(AS,3))
      :IF L=0 THEN L=M
      :IF M<5 THEN M=4
2020 IS=""
      :'No Menu entry
2030 MDM OFF
      :PRINT #2,"Enter Selection Number or Return ?";
2040 GOSUB 1390
      :IF PEEK(65414!)<>0 THEN 2040
2050 PRINT "Selection number = ";AS
2060 S=VAL(AS)
2070 IF AS="R" OR AS="r" THEN GOSUB 2800
      :GOTO 1950 'Provide call-back to user
2080 IF S<0 OR S>M THEN 1950
2090 ON S GOTO 1500,2120,2130 'Goodbye, upload, &
        delete
2100 IF S>3 THEN PRINT "Downloading"
      :GOSUB 2390 'Download a file by number
2110 GOTO 1950
2120 GOSUB 2150
      :GOTO 2020
2130 GOSUB 2500
      :GOTO 2020
2140 '
2150 'Upload!
2160 PRINT #6,"Uploading at ";TIMES$
2170 PRINT "Uploading at ";TIMES$
2180 B=FRE(0)-900
      :IF U=L THEN PRINT #2,"You must re-dial"

```

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```

:GOTO 1500
2190 IF M=U-1 OR B<0 THEN PRINT "Memory Full"
:PRINT #2,"Memory Full..Wait.."
:D=5
:GOSUB 2550
:GOTO 2180
2200 PRINT #2,""
:PRINT #2,"*** Type CTRL-C to END your Upload
***"
2210 PRINT #2,"Upload will pause after <";B;
"> Bytes"
:N=M+1
2220 PRINT #2,"to Save File #5 to Cassette..."
'Should be remainder of File, not 5
2230 F$="MU"+STR$(N)+D$
:OPEN F$ FOR OUTPUT AS 3
2240 PRINT #2,"Enter Text:"
2250 B=FRE(0)-900
:D=5
2260 IF B<0 THEN GOSUB 2550
:GOTO 2250
2270 GOSUB 1390
:PRINT #2,C$;
:PRINT #3,A$
:B=B-LEN(A$)
2280 IF B<0 THEN 2260
2290 CLOSE 3
:PRINT #2,CQ$
:PRINT #2,"File Closed. OK to save Y/N ?";
:GOSUB 1390

```

```

2300 IF A$="N" OR A$="n" THEN RETURN
2310 PRINT #2,""
:PRINT #2,"Thank you for uploading!"
2320 OPEN "MENU" FOR APPEND AS 3
2330 PRINT #3,USING "##";M+1;
:PRINT #3,USING "\
\";". "+N$+"s";
:PRINT #3,TIMES+" on "+DAY$+" "+DATE$
2340 CLOSE 3
2350 M=M+1
:IF M>L THEN L=M
2360 IF M<N THEN N2$="MU"+STR$(U)+D$
:NAME N1$ AS N2$
:NAME F$ AS N1$
:U=U-1
2370 RETURN
2380 '
2390 'Download a menu item
2400 PRINT #6,"Download request ";S;" at ";
TIMES
2410 PRINT "Download request ";S;" at ";TIMES
2420 MDM ON
:F$="MU"+STR$(S)
2430 OPEN F$ FOR INPUT AS 3
:PRINT #2,""
2440 IF EOF(3) THEN MDM OFF
:GOTO 2470
2450 LINE INPUT #3,A$
:PRINT #2,A$
2460 IF I$=CC$ THEN 2480 ELSE 2440
2470 PRINT #2,""

```

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```

:PRINT #2,"END OF FILE:"
2480 CLOSE 3
:GOTO 2020
2490 '
2500 PRINT "Backup and Delete files"
2510 PRINT #2,"File # to delete ?";
:GOSUB 1390
:D=VAL(A$)
:IF D<5 OR D>M THEN RETURN
2520 PRINT "Deleting file # ";D
2530
:PRINT #2,"Delete #";D;"; Are you sure Y/N ?";
:GOSUB 1390
:A$=RIGHT$(A$,1)
:IF A$<>"Y" AND A$<>"y" THEN RETURN
2540 PRINT #6,"Deleting file ";D;" at ";TIMES$
2550 PRINT #2,""
:PRINT #2,".Wait..."
:FOR I=1 TO 1000
:NEXT
2560 OPEN "MENU" FOR INPUT AS 4
2570 INPUT #4,A$
:IF VAL(LEFT$(A$,2))<>D THEN 2570
2580 CLOSE 4
:PRINT A$ 'get file name to delete
2590 I=INSTR(1,A$,".")
A$=MID$(A$,I+2,6)
2600 N1$="MU"+STR$(D)+D$
:N2$=A$+D$
:NAME N1$ AS N2$
2610 'Save file to be deleted ONTO CASSETTE so it's
not lost
2620 OPEN A$ FOR INPUT AS 4
:A$="CAS:"+A$
:OPEN A$ FOR OUTPUT AS 5
2630 IF EOF(4) THEN CLOSE 4,5
:GOTO 2650
2640 LINE INPUT #4,A$
:PRINT #5,A$
:GOTO 2630
2650 OPEN N2$ FOR OUTPUT AS 4
2660 OPEN "MENU" FOR INPUT AS 5
2670 LINE INPUT #5,A$
:IF VAL(LEFT$(A$,3))<>D THEN PRINT #4,A$
:GOTO 2670
2680 IF M=D THEN 2710 ELSE LINE INPUT #5,A$
2690 N1$="mu"+STR$(D+1)+D$
:N3$="mu"+STR$(D)+D$
:NAME N1$ AS N3$
2700 PRINT #4,USING "##";D;
:PRINT #4,RIGHT$(A$,LEN(A$)-2)
:D=D+1
:GOTO 2680
2710 CLOSE 4,5
:M=M-1
2720 N1$="MU"+STR$(M+1)+D$
2730 NAME "MENU.DO" AS N1$
:NAME N2$ AS "MENU.DO"
2740 OPEN N1$ FOR OUTPUT AS 4
:CLOSE 4
2750 RETURN
2760 '
2770 'Major changes to call user back, or time-out
or redial trying.

```

```

2780 '
2790 'Change P$ to PH$ for version 1.06, 3/12/85
2800 RETURN
:PRINT #2,"Call you back at ";PH$;" or return
you to menu (Y/N/M[enu])?";
:GOSUB 1390
2810 IF LEFT$(A$,1)="N" OR LEFT$(A$,1)="n" THEN
PRINT #2,"Enter number to call ";
:GOSUB 1390
:PH$=A$
:GOTO 2830
2820 IF LEFT$(A$,1)="M" OR LEFT$(A$,1)="m" THEN
RETURN
2830 PRINT "Calling ";N$;" at ";PH$;" ";TIMES$;" ";
DATE$
2840 PRINT #2,"System will call you in 30 seconds."
2850 PRINT #2,"Hangup and disconnect from line;
when"
2860 PRINT #2,"your phone rings, press F4 and log
on."
2870 'Close modem files, hang up, THEN wait 1/2
minute
2880 CLOSE 1
:CLOSE 2
:CALL 21179
2890 FOR I=1 TO 10000
:NEXT I 'wait 30 seconds
2900 PRINT #6,"Calling ";N$;" at ";PH$;" ";TIMES$;
"; DATE$
2910 '
2920 'Following code is from DIAL1#
2930 FOR V = 1 TO ND 'Try to dial it ND times
2940 CALL 21200 'hook up phone
2950 GOSUB 3150 'wait a bit
2960 GOSUB 3150
2970 FOR J=1 TO LEN(PH$) '# to dial
2980 B$= MID$(PH$,J,1)
2990 IF B$="-" OR B$=":" THEN 3030 'ignore these so
DIALER2 program can use same ADRS.DO entry
3000 IF B$="<" THEN 3040 'quit dialing
3010 A=ASC(B$)
3020 CALL 21514,A,0 'dial digit
3030 NEXT J
3040 GOSUB 3150
3050 FOR K=1 TO 500
3060 CALL 62801!,0,0 'check for carrier
3070 AB=PEEK(62950!)
3080 IF AB=0 THEN BEEP
:BEEP
:PRINT #6,"Remote carrier received"
:GOTO 3160
3090 NEXT K
3100 'hang up phone & try again
3110 CALL 21179
:GOSUB 3150
3120 NEXT V
3130 PRINT #6,"Unsuccessfully dialed ";ND;" times"
3140 RUN 'Restart program
3150 FOR JJ = 1 TO 800
:NEXT JJ
:RETURN '2.4 second delay loop
3160 OPEN "MDM:8N1E" FOR INPUT AS 1
3170 OPEN "MDM:8N1E" FOR OUTPUT AS 2
3180 RETURN

```


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When we designed *Disk+* we did it out of necessity. We wanted a way that we could just connect a Model 100 to our desktop computer with a cable and save files onto the desktop's disk drive. We wanted it to be so simple to use it would be self-explanatory.

Picture this. *Disk+* comes to you on a Snap-in ROM and a diskette for your desktop. You take a quarter and open the little compartment on the back of your Model 100. Then you just press the ROM into the socket. *Disk+* appears on your main menu just like a built-in.

You connect your Model 100 to your other computer using an RS232 cable (available from PCSG for \$40).

You just place the *Disk+* diskette into the desktop's drive and turn on the computer. It powers up automatically and says "awaiting command" on your desktop's screen. Then you just put the widebar cursor on the Model 100 main menu on *Disk+* and press ENTER. You are shown your RAM files arranged just like the main menu.

To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

Disk+ takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk+* users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

This means you can write something on your Model 100, and with *Disk+* transfer it

instantly to your desktop and start using it right away on your bigger computer. Or the way we like to work is to type in a document on the desktop computer and then transfer it to our Model 100 with *Disk+*. Then we print out the document, beautifully formatted, using WRITE ROM.

Disk+ works with just about every micro sold, from IBM PC and its clones, to all Radio Shack computers (yes, all), to Apple II, Kaypro, Epson and most CPM. Just ask us. More than likely, your computer is supported.

Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk+* they have an inexpensive disk drive.

And if that weren't enough, how about this: *Disk+* also provides cross-compatibility between different computers like IBM, Apple or the Model 4 using the Model 100 as the intermediary device. Quite a feature!

The snap-in ROM is really great because you can use other ROMs like *Lucid* or WRITE ROM. They snap in and out as easily as an Atari game cartridge and you never lose your files in RAM.

Anyone who ever uses *Disk+* simply can't do without it. But so many times we have had new users call us and say, "Wow! I had no idea when I ordered it that *Disk+* would be so fantastic. I just couldn't believe that I could use my desktop computer's disk drive with my Model 100 just like it is another main menu."

That's why we sell *Disk+* on a thirty-day trial. If you aren't completely satisfied, return it within thirty days for a full refund. Priced at \$149.95 on Snap-in ROM. MasterCard, Visa or COD.

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Circle 36 on Reader Service Card

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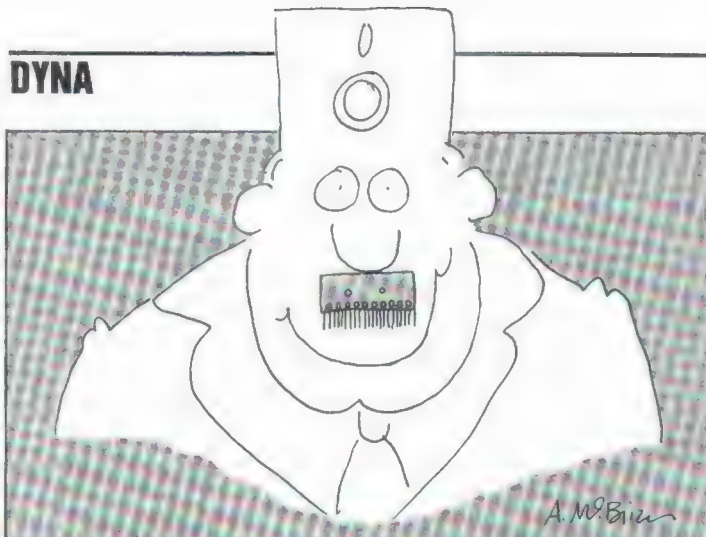
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DYNA



(listing continued from page 64)

*Listing 2: Source for TELKY2
which resets F6 and F7 from their Telcom meanings of
"FILES" and "MEM." The host 100
which runs DYNA will have to reset these keys.*

```
10 PRINT "TELKY2 -- Set or undo TELKEY F6, F7"
   'Apparently MINET and its variants won't work if
   F6 is set because of the XON control
15 INPUT "Set F6, F7 to MEM & FILES in TELCOM or
   reset F6 and F7 to power up contents [R/S]"; AS
17 IF LEFT$(AS,1)="r" OR LEFT$(AS,1)="R" THEN 20
   ELSE 70
20 PRINT "Reset to original"
   :FOR I = 0 TO 2 STEP 2
30 POKE 64268+I,243
40 POKE 64269+I,127
50 NEXT I
60 STOP
70 PRINT "Set to display memory and file in TELCOM"
80 POKE 64268,172
   :POKE 64269,126
   :POKE 64270,58
   :POKE 64271,31
```

(text continued from page 57)

DYNA's modules. To test the workings of the networked book with any new modules, you might want to follow the simple procedure of adding your own routines (in modules, please) and "commenting out" the lines not needed. However remember that by commenting out lines you don't need, you may comment out lines that the program needs to function.

In several hours of designing and programming, we had extended the functions of the Model 100 and free software to produce a ring-back, interactive format which might be used to produce a newsletter or opinion poller for a number of notebook computer users.

If Model 100 users respond to the challenge, Tandy may suddenly find it has an interactive media controller on the market before any of its competitors. ☐

Please help us rate this article's value. If you've found it very valuable, circle 161 on the Reader Service Card. If it was moderately valuable, circle 162—and if it wasn't valuable to you, circle 163.

LOGO (from page 36)

```

375 PRINT
380 PRINT "HIT KEY IN [ ] TO SELECT";
385 CH$=INKEY$
IF CH$=" " THEN 385
400 IF CH$="e" THEN GOSUB 550
:GOTO 350
405 IF CH$="n" THEN GOSUB 700
:GOTO 350
410 IF CH$="h" THEN GOSUB 750
:GOTO 350
425 IF CH$="l" THEN GOSUB 4500
:GOTO 350
428 IF CH$="q" THEN END
430 GOTO 350
:REM unknown command
500 END
510 REM
512 REM
514 REM ***** SUBROUTINES *****
516 REM
550 REM -----execute function-----
555 CLS
557 IF SP=-1 THEN BEEP
:PRINT "NOT EXECUTABLE"
:FOR ZZ=1 TO 300
:NEXT ZZ
:RETURN
560 PRINT "execute:"
:PRINT
565 INPUT "name of function ":CMS
590 CM=0
:REM unknown function so far
600 FOR K=1 TO FN
605 IF CM$=FNS(K) THEN CM=K
K=FN
:REM found function
610 NEXT K
620 IF CM<>0 THEN 630
622 PRINT "unknown function: ";CMS
623 PRINT
624 PRINT "hit [SPACE BAR] to return to menu";
626 K$=INKEY$
IF K$<>" " THEN 626 ELSE RETURN
630 TS=1
:REM set top of stack to 1
635 S(TS)=ST
:REM make turtle program end when function is
done
640 R(TS)=-1
:REM mark as a function call
650 ST=FL(CM)
:REM line at which to start
660 GOSUB 6500
670 RETURN
:REM to menu
700 REM -----NAMES OF FUNCTIONS-----
705 CLS
706 IF SP=-1 OR FN=0 THEN PRINT "no functions
defined yet"
:GOTO 715
708 PRINT "NAMES OF FUNCTIONS:"
:PRINT
710 FOR K=1 TO FN
:PRINT FNS(K); " ";
:NEXT K
715 PRINT
:PRINT
720 PRINT "HIT [SPACE BAR] TO RETURN TO MENU";

```

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```

722 KS=INKEY$
:IF KS<>" " THEN 722
725 RETURN
750 REM -----HELP-----
755 CLS
:PRINT "TURTLE COMMANDS:"
:PRINT
760 FOR K=1 TO PR
:PRINT PR$(K);" ";
:NEXT K
765 PRINT
:PRINT "HIT [SPACEBAR] FOR MENU";
770 KS=INKEY$
:IF KS<>" " THEN 770
775 RETURN
800 REM -----error handling---
805 IF ERR=7 THEN PRINT "out of memory"
:END
810 IF ERR=52 THEN PRINT "file not found"
:FOR Z=1 TO 500
:NEXT Z
:RESUME 350
815 IF ERR=55 THEN PRINT "bad file name"
:FOR Z=1 TO 500
:NEXT Z
:RESUME 350
820 PRINT "error code ";ERR;" in line ";ERL
:STOP
825 REM end of error handling
985 REM -----
990 REM plot and move turtle
1000 X2=X
:Y2=Y
:REM store old values
1010 X=X+R*COS(TH*RC)
:REM rc is radian conversion factor
1020 Y=Y+R*SIN(TH*RC)
1022 REM CHECK FOR HORIZONTAL OFFSCREEN
1025 IF X>HM OR X<-HM OR X2>HM OR X2<-HM THEN
GOSUB 1050
:GOTO 1035
1027 REM CHECK FOR VERTICAL OFFSCREEN
1030 IF Y>VM OR Y<-VM OR Y2>VM OR Y2<-VM THEN
GOSUB 1050
:GOTO 1035
1032 IF P=1 THEN LINE (X2+HM,Y2+VM)-(X+HM,Y+VM),1
:REM plot if pendown
1035 RETURN
1050 REM -----OFFSCREEN-----
1052 PRINT "off screen";
:FOR K=1 TO 15
:PRINT " ";
:NEXT K
1053 FOR K=1 TO 25
:PRINT CHR$(8);
:NEXT K
:REM BACKSPACES
1055 SOUND 6269,5
:REM MAKE A SOUND
1060 PRINT " ";
:REM 10 SPACES
1065 FOR K=1 TO 10
:PRINT CHR$(8);
:NEXT K
:REM backspaces
1070 RETURN
1900 -----

```

```

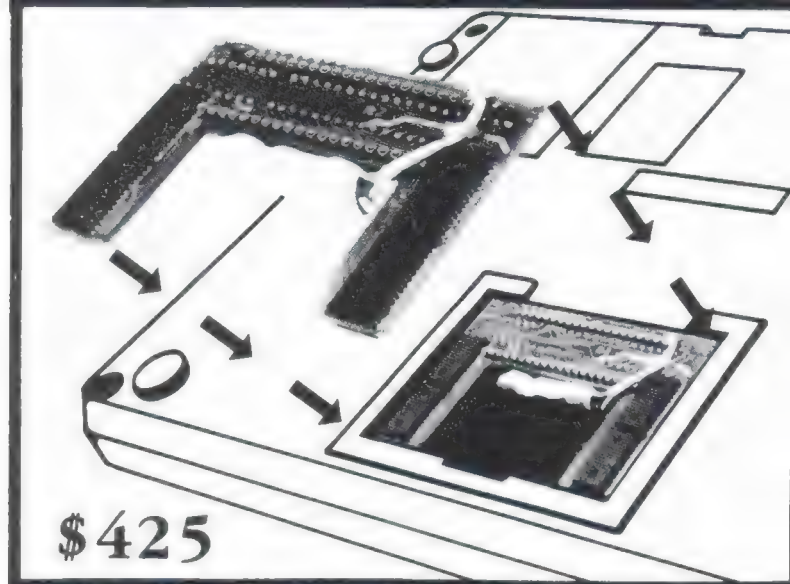
4500 REM load and store function loc
4505 CLS
:PRINT "load"
:PRINT
4510 INPUT "name of file ";NA$
4520 OPEN NA$ FOR INPUT AS #1
4525 PRINT
:PRINT "loading ";NA$
:PRINT
4530 REM
4532 FN$=""
:REM current function
4534 FN=0
:REM number of defined functions
4536 SP=0
:REM number of commands
4538 REM
4540 FOR LN=1 TO M
:REM m=maximum number of lines
4550 IF EOF(1) THEN SP=LN-1
:LN=M
:GOTO 4680
:ELSE INPUT #1,L$
4560 REM if we have end of file store number of
lines in sp and exit for loop
4565 IF LEN(L$)=0 THEN LN=LN-1
:GOTO 4680
:REM ignore blank lines
4570 GOSUB 5000
:REM parse command
4571 GOSUB 5200
:REM tokenize command
4572 CM$(LN)=CM
:NO$(LN)=NO
:REM store tokenized command and argument
4580 IF CM$="to" THEN GOSUB 4800
:REM function definition
4640 IF CM$="end" THEN GOSUB 4900
4680 NEXT LN
4682 IF NOT EOF(1) AND SP<>-1 THEN BEEP
:PRINT "ERROR: file over";M;"lines"
:SP=-1
4685 REM we have now read the file
4687 CLOSE #1
:REM close the file
4689 IF CM$<>"end" AND SP<>-1 THEN PRINT "error:
last function has no end"
:SP=-1
4692 REM set error flag
4700 REM if sp=-1 then the file is unexecutable
4702 REM otherwise sp= the number of lines in the
file
4710 IF SP=-1 THEN PRINT "THE FILE IS NOT
EXECUTABLE" ELSE PRINT "ok"
4715 PRINT
:PRINT "Hit SPACE BAR to return to menu";
4717 KS=INKEY$
:IF KS<>" " THEN 4717
4719 PRINT
4720 RETURN
4725 REM
4730 REM
4800 REM -----function definition ---
4805 IF FN$ <>"" THEN PRINT "error: no end of
function ";FN$
4807 IF FN$<>"" THEN PRINT "that was declared on

```


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Each bank is like having another Model 100, and all the built-in programs as well as any snap-in ROM programs appear in all four banks and work the same way. Your widebar cursor moves from file to file and you access any file or run any program just by pressing ENTER.

What lets you copy any file from one bank to another is a snap-in ROM from PCSG called RAM+, that comes at no extra charge. It just pushes right into the little socket in that same compartment with the 96K expansion unit.

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Copy a file from bank to bank with a function key

You can also rename a file, or kill any file with just a function key. Plus you can do a whole lot of other useful things like setting the date, day and time with function key ease. You even have a function key that lets you use non-Radio Shack printers without having to make those tricky dipswitch settings.

RAM+ lets you cold start any one of your banks without affecting the other three. That means that anytime you want you can clean out a bank's entire memory, but leave intact all the files in the other banks.

What is also fantastic is that you don't have to have the ROM in place to use the additional RAM. Whenever you take out the snap-in ROM it leaves behind a tiny machine code program that lets you switch from bank to bank just by pressing ENTER.

This lets you use your ROM socket to snap-in other ROMs like LUCID spreadsheet, WRITE ROM text processor, or DISK+ ROM file transfer program, and use them in any or all four banks. All of these, by the way, are available from PCSG.

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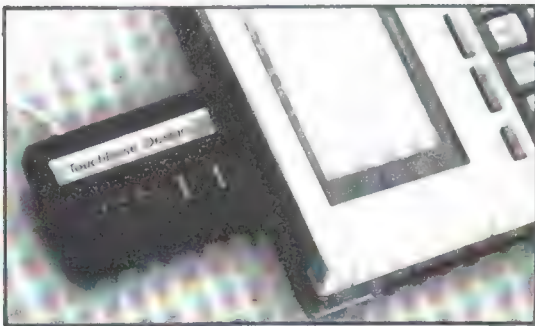
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```

line";FL(FN)
:LN=M
:SP=-1
:RETURN
4809 IF FN=MF THEN BEEP
:PRINT "error: more than";MF;"functions"
:SP=-1
:LN=M
:RETURN
4810 FN=FN+1
:REM new function
4815 FN$=MID$(L$,4,LEN(L$))
:REM function name
4820 FN$(FN)=FN$
:REM store func name
4825 FL(FN)=LN
:REM store line on which function is defined
4827 RETURN
4830 REM
4835 REM
4900 REM -----end of function-----
4905 IF FN$<>"" THEN PRINT FN$;" defined"
:FN$=""
:RETURN
4910 PRINT "error: non-matching end statement on
line";LN
:LN=M
:SP=-1
:RETURN
4915 REM unexpected end command
5000 REM -----parse the command l$ ---
5027 CM$=""
:REM no command yet
5029 NO=0
:REM no number yet
5030 PS=INSTR(1,L$," ")
:REM search for a space
5055 IF PS=0 THEN CM$=L$
:RETURN
:REM command needs no number
5060 CM$=LEFT$(L$,PS-1)
:REM the command
5080 NO=VAL(MID$(L$,PS,LEN(L$)))
:REM thenumber associated with the command
5090 RETURN
5100 REM -----store primitives
5102 REM
5105 DATA to,repeat,turn,endrepeat,penup,pendown,
heading,forward,setunits
5110 DATA addunits,clear,end,center,posunits?
5120 DATA back
5130 DATA *
5145 RESTORE
:REM start reading the data
5150 FOR K=1 TO MP
:REM mp is maximum number of primitives allowed
5155 READ C$
5160 IF C$="*" THEN PR=K
:K=MP
:REM done reading primitives
5162 PR$(K)=C$
:REM store primitive
5165 NEXT K
5166 IF C$="*" THEN RETURN
5167 BEEP
:PRINT "warning: too many primitives declared"
:PRINT

```

```

5169 PRINT "hit [SPACE BAR] to continue"
5170 K$=INKEY$
:IF K$<>" " THEN 5170
5172 RETURN
5200 REM -----tokenize command-----
5205 CM=0
:REM unknown command or user defined command
5210 FOR K=1 TO PR
:REM see if a primitive
5215 IF CM$=PR$(K) THEN CM=K
:K=PR
:REM a match
5220 NEXT K
5222 IF CM <> 0 THEN RETURN
:REM a match
5225 IF FN<>0 THEN 5230
:REM see if is a defined function
5227 PRINT "unknown command "; CM$;" in function";
FN$
:SP=-1
:LN=M
:RETURN
5230 FOR K=1 TO FN
:REM see if defined function
5235 IF CM$=FN$(K) THEN CM=9999+K
:K=FN
:REM command was function call
5240 NEXT K
5245 IF CM <> 0 THEN RETURN
:REM tokenized
5250 PRINT "error: unknown primitive or
function: ";CM$;" in function ";FN$
5255 SP=-1
:LN=M
:REM error
5260 RETURN
6500 REM -----run---
6504 CLS
:REM clear the screen
6505 IF CM=0 THEN PRINT "program not executable"
:FOR ZZ=1 TO 1000
:NEXT ZZ
:RETURN
6506 X=0
:Y=0
:REM center the turtle
6508 P=1
:REM pendown
6510 R=5
:REM initial units
6512 TH=0
:REM initial heading
6513 PRINT "PERIOD KEY STOPS PROGRAM";
6514 FOR K=1 TO 24
:PRINT CHR$(8);
:NEXT K
:REM BACKSPACE
6515 FOR LN=ST TO SP
6517 T$=INKEY$
:IF T$="." THEN LN=M
:GOTO 6800
:REM period key is break key
6520 REM
6525 REM
6530 CM=CM%(LN)
:NO=NO%(LN)

```


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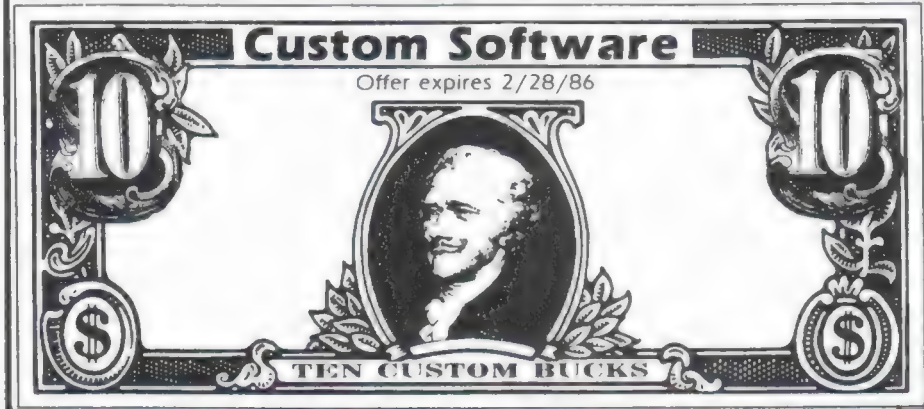
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LOGO

```

6531 IF CM > 9999 THEN 6700
      REM see if user-defined
      command
6532 ON CM GOTO 6535,6542,6545,
      6550,6560,6570,6595,6600,
      6610,6620,6630,6650
6533 ON CM-12 GOTO 6652,6654,
      6655
6534 REM -----
6535 GOTO 6800
      REM to command
6542 GOSUB 7000
      GOTO 6800
      REM repeat
6545 TH=TH+NO
      GOTO 6800
      REM turn
6550 GOSUB 8000
      GOTO 6800
      REM endrepeat
6560 P=0
      GOTO 6800
      REM penup
6570 P=1
      GOTO 6800
      REM pendown
6595 TH=NO
      GOTO 6800
      REM heading
6600 GOSUB 985
      GOTO 6800
      REM forward
6610 R=NO
      GOTO 6800
      REM setunits
6652 X=0
      Y=0
      GOTO 6800
      REM center
6654 IF R=0 THEN GOSUB 9500
      GOTO 6800 ELSE GOTO 6800
      REM posunits?
6655 R=R*-1
      GOSUB 985
      R=R*-1
      GOTO 6800
      REM back
6656 GOTO 6800
      REM next line
6700 REM is user-defined
      function .....
6705 CM=FL(CM-9999)
      GOSUB 9000
      REM call function
6800 NEXT LN
6801 PRINT "hit [spacebar] for
      menu."
6803 KS=INKEY$
      IF KS<>" " THEN 6803
6810 RETURN
7000 REM -----repeat-----
7005 IF TS<MS THEN 7010
7007 BEEP
      PRINT "error: too many
      function calls or
      repeat loops."

```


LOGO

```

7008 PRINT "stack overflow on
line ";LN
:LN=SP
:RETURN
:REM stop
7010 TS=TS+1
:REM increment top of stack
7020 S(TS)=LN
:REM store the line number
in the stack
7030 R(TS)=NO
:REM the number of times to
repeat
7040 RETURN
8000 REM -----endrepeat-----
8005 IF TS=0 THEN PRINT
"unmatched endrepeat on
line ";LN
:RETURN
8010 R(TS)=R(TS)-1
:REM decrement stack counter
8020 IF R(TS)=0 THEN TS=TS-1
:RETURN
:REM pop the stack
8025 LN=S(TS)
:REM go back to stored line
8030 RETURN
9000 REM A USER-DEFINED COMMAND
9002 IF TS<MS THEN 9010
:REM no stack overflow
9004 BEEP
:PRINT "error: too many
repeats and or function
calls."
9005 PRINT "stack overflow in
line ";LN
:LN=SP
:RETURN
9010 TS=TS+1
:REM increment stack
counter.
9020 S(TS)=LN
:REM store the line number
in the stack
9030 R(TS)=-1
:REM symbol for function
call
9040 LN=GM
:REM go to function
9050 RETURN
9060 REM
9070 REM
9500 REM RETURN FROM
USER-DEFINED COMMAND---
9510 IF R(TS) < -1 THEN PRINT
"error: premature end of
repeat loop on line";LN
9515 IF TS=-1 THEN LN=SP
:RETURN
:REM program is done
9520 LN=S(TS)
:TS=TS-1
:REM go back to line that
called function
9530 RETURN

```

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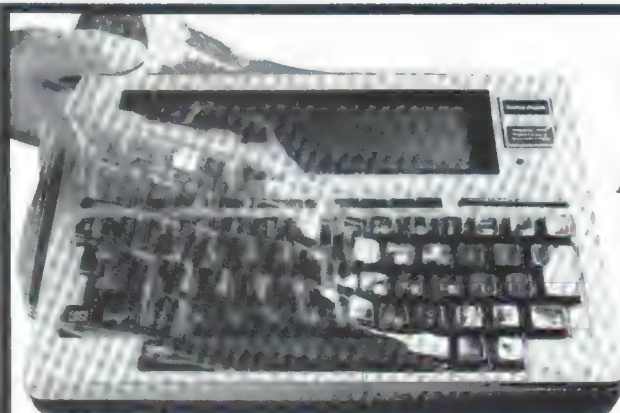
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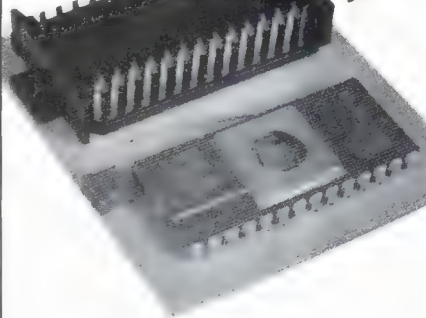
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LOGO

and you're right. For example, the function:

```
to infinity
infinity
end
```

will keep calling itself until it gets the error: stack overflow.

To stop a recursive program, we use the command *posunits?*. This command, which goes at the beginning of a recursive function, will stop if the units the turtle moves become non-positive.

Figure 2 shows a recursive program that uses the *posunits?* command. The program draws a tree on the screen. Function *root* sets the units and calls the function *tree*.

Figure 2: A recursive tree program

```
to tree
posunits?
turn -10
forward
addunits -4
tree
addunits 4
back
turn 20
forward
addunits -4
tree
addunits 4
back
turn -10
end

to root
setunits 20
tree
end
```

The book *Turtle Geometry*, Abelson and diSessa, MIT Press, 1981 discusses trees and other recursive designs in more detail. Commands in the book are similar to those used in this program.

ARTIST AT WORK

When you run the program, a menu appears on the screen. You'll have the following options:

Load a file: This loads a workspace that contains your functions. If there's a syntax error, you'll be notified of its location. It's preferable to have your workspace in random access memory (RAM) rather than on cassette so if there are any errors you can correct them quickly.

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Execute a function: This lets you run one of your functions. Turtle language doesn't distinguish between functions and subroutines, therefore anything that has been defined can be called.

For example, if you have a function *circle* that's called by a function *flower*, you may run either of them. This makes it easy to find errors. Suppose you had a workspace like Figure 1, and when you called *flower* it didn't produce the design you wanted. Since *flower* calls *circle*, the problem could be in either of the two functions. By running them one at a time, you can find out which one was in error. Because of this "modular programming" concept, you can write and debug simple functions and then combine them to make more complicated ones.

Names of functions: Gives you the names of functions that are in the most recently loaded workspace.

Help: Gives you a list of all turtle language primitives (pre-defined commands).

Quit: Exits the program and returns to BASIC.

HOW IT WORKS

When loading a workspace, the minilogo system checks the command syntax, tokenizes the functions and stores the locations of functions that are in the workspace.

To run a particular function, the system looks up the location of the function in the workspace and executes it. The tokens tell the program which BASIC commands to execute.

If a function calls another function, the system stores its present location in a stack, then runs the new function. When it's done, it pops the stack to find out where to return. This is analogous to what BASIC does when it sees a GOSUB command. Nested repeat loops are also implemented using a stack. □

If readers have questions or comments about Ben Firschein's program, the author invites them to write him at 29 Stowe Lane, Menlo Park, CA 94025.

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TELCOM (from page 10)

cessfully connected to another modem, it goes into on-line mode. When in on-line mode, the modem won't respond to programming commands, unless the string +++ is typed, with a pause before and after.

Here's a brief list of the most common Hayes modem codes — use these when modifying existing software to use — or not use — this new modem standard.

Most local commands, begin with the string AT. Command strings should be in all upper case, terminated with a carriage return (ASCII 013). The Tandy 1200-bps internal modem user's manual is the source for this information.

DIALING

A sample dial command might be AT DT 1 555 1212. The spaces are optional. Here are the parts of the dial command:

D — Dial. The Hayes-compatible modem goes to originate mode and will dial the number following.

, — Comma. The modem should pause for two seconds, perhaps to wait for a dial tone.

T — Tone. Switch to tone dialing.

P — Pulse. Switch to pulse dialing.

R — Reverse. Switch to ANSWER mode after dialing.

W — Wait. Wait for dial tone.

OTHER COMMANDS

A/ — Repeat last command. This command isn't prefaced by AT and does not require a terminating carriage return.

F0 — Place modem in half-duplex mode. F1 used full-duplex, which means that the modem echoes characters sent back to the other modem.

H0 — Hang up the telephone. H1 takes the telephone off-hook.

M0 — Turn off the monitor speaker on the modem (if it exists). M1 turns on the speaker until a carrier tone is received. M2 puts the speaker on all the time — useful for monitoring line noise.

V0 — The modem should tell its status via code numbers. V1 tells the modem to use English words.

Hayes-compatible modems use additional commands and memory registers to set special values, such as the number of rings before auto-answer and the duration of tone-dialing signals. These commands and registers sometimes vary from modem to modem.

Information on these more specialized commands can be found in a Hayes-compatible modem's user's manual. □

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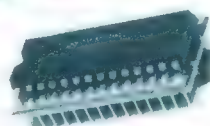
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79	54	Radio Shack
56	59	Rainbow Computers
50	71	Sias Engineering
4	51	Sigea
60	50	Sigea
46	52	Softmate
74	70	Sound Sight
74	60	Technology First
27	65	Time-Soft
44	57	Traveling Software
1	55	Traveling Software
CII	72	Traveling Software
25	57	Traveling Software

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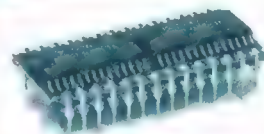
PG Design RAM modules have become the number one choice for Model 100, Tandy 200 users, not just because more people are using PG Design RAMs than any other brand—But because our name has become synonymous with **PREMIUM QUALITY, RELIABILITY, and IMMEDIATE CUSTOMER SERVICE.**



MODEL 100 64K RAM MODULE



MODEL 100 8K RAM MODULE



TANDY 200 24K RAM MODULE

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We develop the most advanced products of their kind by using the latest technology and the highest quality components available. Before we bring any product to market, it is carefully evaluated in the field by professionals. If it doesn't meet their standards, it doesn't meet ours. And when we finally bring our product to market, it's the finished product. It works as we say it will, and it will keep on working reliably. "Our reputation for excellence is riding on each and every RAM module we ship."

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8K RAM modules—\$29.95 ea. Set of three \$84.00 (available for NEC 8201A)

Tandy 200
24K RAM modules—\$139 ea. \$135 ea. two or more

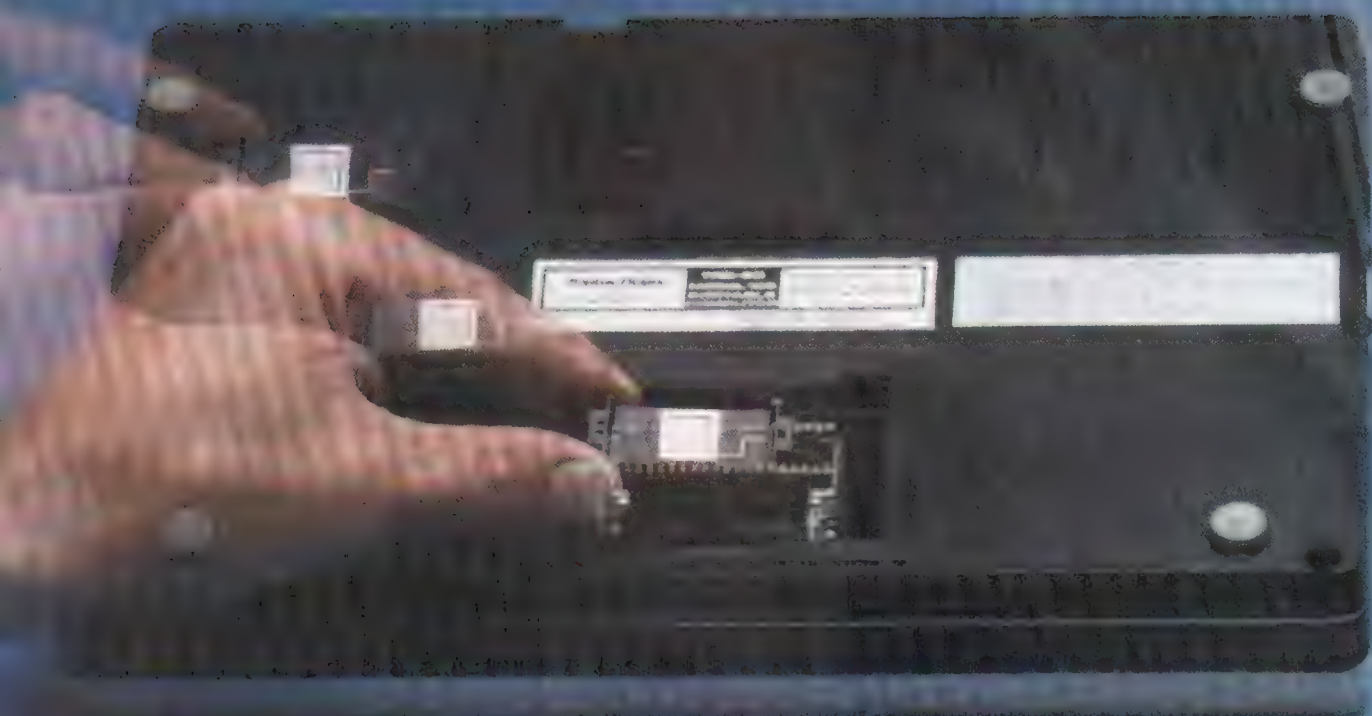
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PG Design



IF YOU'RE MISSING THIS, Add Multiplan or Interactive Solutions to

If you own a Model 100, then you already know. You know that the Model 100 comes with five built-in management programs. You know about the full-size typewriter-style keyboard and the direct-connect modem and telephone auto-dialer. But did you know how easy it is to boost your portable's power with Multiplan or Interactive Solutions?

You're really notoring out if you don't know how easy it is to supercharge your Model 100. Just turn your machine over, pop in either of these high-performance ROM mod-

ules, and you're off. Multiplan handles everything from complex spreadsheet analysis and calculations to sales forecasts, profit-and-loss projections, budgeting, pricing, engineering calculations and much more.

Powerful Spreadsheet

Let Multiplan (26-0029, \$149.95) replace your pen, paper and calculator. Multiplan is an electronic worksheet—a large grid for entries, each of which can be words, files, numbers or formulas. Multiplan then performs complex calculations . . . instantly! And because it remembers relationships between entries on a worksheet, it can do complex calculations

number of variables. This lets you test plans by putting different values into your formulas.

You can run sensitivity analysis, do budgets and resource planning, and schedule more efficiently. You'll soon find that Multiplan is a vast improvement over "hand calculating." Multiplan overcomes the limitations of paperwork. It offers a worksheet with up to 40 rows and 63 columns. You can instantly insert or erase data and widen or shrink columns, eliminating the costly and time-consuming work of typing or hand-printing the worksheet. For more information, call 1-800-4-A-Multitask.



YOU'RE MISSING OUT!

Supercharge your Model 100 Portable.

Get Three Programs for the Price of One

Interactive Solutions (26-3844, \$149.95) is a three-in-one cross-referencing software package with database management, spreadsheet analysis, and word processing.

Because Interactive Solutions is a ROM add-on, it increases the amount of memory that can be utilized by your Model 100. In addition, you can save data on cassette instead of using valuable RAM memory.

Information stored in Data Manager, the data base, can be utilized by Data Calc, the

Word Processor allows you to merge Data Manager information into your text. Or you can select any part of a Data Calc worksheet and add it to any text file in Word Processor.

Interactive Solutions is easy to learn too, because it's designed to be self-explanatory and guide you through each process. Clear and concise labels and menus make decision making easy.

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TANDY SUPPORTS TECH EDUCATION

Tandy Corp. is playing a major role in computer education and research. Recently, the company has formed a Council on Microelectronics Technology, an association which links Tandy directly to selected universities across the country.

According to Tandy chief executive officer John Roach, "The formation of the council is a natural extension of our long-standing commitment to a partnership with educational institutions."

The council's purpose is to exchange information on research and development, implementation and evaluation of leading-edge applications of technology among participating members.

Member institutions will work closely with Tandy's Educational Division, which will provide consultation and special project support.

The council, which is the result of a year-long planning effort, will publish a journal with papers and articles reflecting project activities. This journal will be distributed to major universities and to selected engineering libraries of major companies.

Economical Computing

On-board computers have provided invaluable assistance to airplane pilots for years. Now personal computers are helping steer the American economy.

Chase Econometrics, a well-known macroeconomic forecasting firm based in Bala Cynwyd, Pennsylvania, is using custom software on an IBM PC/AT to produce its monthly reports. According to Lawrence Chimerine, chairman of the firm, all forecasts will be generated on microcomputers. The software: PC SIM, a model simulator developed by the company.

"Until now, we've been generating our monthly U.S. Macroeconomic Forecast through timesharing access to an Amdahl V-8 mainframe computer," said Chimerine, who also serves as Chase's

Chief Economist. "Our new simulator was developed to allow our forecasters and clients to simulate our macro model without the need for mainframe access."

The Chase Econometrics model of the U.S. economy is a large 375-equation simultaneous model. A few years ago, solving this equation required very expensive computing hardware and software. Now, a PC/AT can solve the problem in less than two minutes, reports Chimerine.

Chase Econometrics will continue to use the Amdahl mainframe to store and access data, but all model simulations and forecasting will be done on the microcomputers.

What's next? Perhaps town planning with a Model 100?

Help for the Handicapped

These days, virtually all careers are possible for the blind — even computer programming and operation.

Telesensory Systems Inc., based in Mountain View, California, is dedicated to manufacturing and marketing high-technology devices for persons who are blind or have low vision. Their latest product: Soft VERT, an IBM-compatible synthetic speech output system.

Soft VERT (VERbal Terminal) provides several new functions for IBM PC-compatible computers. A key feature of

the memory-resident product is the "second cursor"; the user can check data on any part of the screen without moving an application's cursor location. Other features include:

- Announcement of key entries
- Help functions
- Cursor routing to any part of the screen
- Customizable pronunciation dictionary

Soft VERT is available in three versions:

- Software only (\$750)
- Software and Echo GP/PC speech synthesizer (\$950)
- Software and Votrax PSS speech synthesizer (\$1150)

The Echo synthesizer was reviewed in the June, 1984 issue of *Portable 100*, page 61. The Votrax PSS was reviewed in April, 1985, page 26.

Telesensory Systems also markets a more sophisticated verbal terminal system, PC-VERT. The PC-VERT system is being used by telephone operators, programmers, bookkeepers and consultants. It's also popular in educational facilities for the blind and vision-impaired.

Another product by Telesensory systems is Optacon, an electronic reading aid that transforms ink letters into tactile images. Using Optacon, blind readers have access to most printed material.

For more information about Telesensory Systems and its products, contact them at P.O. Box 7455, Mountain View, CA 94039, (415) 960-0920. □





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Have you ever been dealt out of telecommunications in hotels, offices, and other locations while on the road?

Why gamble on finding a modular (RJ-11C) phone jack that accepts your direct connect modem?

Deal yourself a winning hand with the **Black Jack**, the portable modular jack for modems on the go.

- 0-9600 baud
- Fits standard telephone handsets
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- Direct connection, not acoustical
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- Insensitive to environmental noise
- Weighs less than ¼ lb.
- Fits easily into a briefcase
- Compatible with Group 3 facsimile equipment

SUPER ROM **Lucid Spreadsheet Write ROM Database Outliner**



NOW
AVAILABLE
ON
M-200

NOW YOU CAN REALLY HAVE IT ALL!

All on one ROM. Truly the finest four programs available for the Model 100 — guaranteed. Try it for 30 days. If you aren't blown away by the excellence return it for a full refund.

\$199⁹⁵

The four best programs for the Model 100 all on one ROM. 32K of power without using any RAM for program storage. This is the PCSG Snap-In ROM that just presses easily into the little ROM socket in the compartment on the back. You access the four right from the main menu like built-ins.

Write ROM — the definitive word processor for the Model 100. Function key formatting or dot commands. Search and replace. Library feature — inserts words, phrases or whole documents into text from just a code. MAP lets you see a picture of your document. In all there are 60 features and functions. No one can claim faster operation. FORM lets you create interactive forms with on-screen prompts that you can answer from the keyboard. Nothing else for the Model 100 compares with the features of Write ROM. Exactly the same as the Write ROM sold as a single program. Infoworld says it "makes the Model 100 a viable writing unit ... sur-

passed our highest expectations for quality and clarity."

Lucid Spreadsheet: This is the one PICO magazine says "blows Multiplan right out of the socket" and Infoworld performance rated as "excellent" and said "makes the Model 100 compute." Gives you features you cannot get with Lotus 123. Lets you build spreadsheets in your Model 100 that would consume 140-150K on a desktop. Program generating capability with no programming knowledge required. Variable column widths. Includes find and sort with function key control. It's fast, recalculates like lightning. No feature has been taken from the original, only new ones added.

Database: This is a relational data base like no other. You can do everything from mailing lists to invoices. No complicated pseudo-coding, you create input screens as simply as typing into TEXT. You are not limited by size; you can have as large an input screen as you wish. Prints out reports or forms, getting information from as many files as

you like. Complete math between fields. Total interface with Lucid worksheets.

Outliner: Does everything that Think-tank does on a PC but a whole lot better. Includes a Sort for your headlines. Lets you have headlines of up to 240 characters. Has cloning, hoisting and sideways scroll up to 250 characters. Like Lucid, this one sets a new standard for outliners. This is the way to plan and organize your projects.

Present Lucid and Write ROM owners can upgrade for \$100. If you have both it's \$75.

As usual PCSG sells the Super ROM on a thirty day guarantee. If for any reason you are not satisfied, simply return it for a full refund.

We are excited about this product. Super ROM gives the Model 100 the true power of a desktop. No other multi-program ROM has software that compares. But don't take our word for it. We invite you to make that comparison yourself. Priced at \$199.95 on Snap-In ROM.

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